

Distortions To Agricultural Incentives in Tajikistan, Turkmenistan and Uzbekistan

Richard Pomfret

University of Adelaide
richard.pomfret@adelaide.edu.au

Agricultural Distortions Working Paper 05, August 2007

This is a product of a research project on Distortions to Agricultural Incentives, under the leadership of Kym Anderson of the World Bank's Development Research Group (www.worldbank.org/agdistortions). Helpful suggestions from project participants and from John Baffes and Bekzod Shamsiev are gratefully acknowledged. Garry Christensen has provided useful materials on Tajikistan and the Kyrgyz Republic. The authors are grateful also for helpful comments from workshop participants and for funding from the World Bank's Europe and Central Asia Department and Trust Funds provided by the governments of Ireland, Japan, the Netherlands (BNPP) and the United Kingdom (DfID).

This Working Paper series is designed to promptly disseminate the findings of work in progress for comment before they are finalized. The views expressed are the authors' alone and not necessarily those of the World Bank and its Executive Directors, nor the countries they represent, nor of the institutions providing funds for this research project.

Executive Summary

- This chapter analyses distortions in agricultural incentives and competitiveness in Tajikistan, Turkmenistan and Uzbekistan. The dominant agriculture in these three Central Asian countries is irrigated farming centered on cotton, although there is also grain production and all the countries have significant livestock farming.
- Since the dissolution of the Soviet Union, the five Central Asian successor states have followed different strategies in the transition to market-based economies. The three countries dealt with here have lagged the Kyrgyz Republic and Kazakhstan. Uzbekistan and especially Turkmenistan have been the most cautious reformers. Tajikistan was disrupted by civil war for much of the 1990s.
- In Uzbekistan and Turkmenistan the governments influence crop choices and retain control over rents from cotton, as well as subsidizing key input prices. In Tajikistan administered prices disappeared in the civil war of the 1990s, but the institutions for a successful market economy have yet to be established and the government continues to exert control over cotton exports.
- Land reform, although substantial in principle, has in practice progressed slowly in both Uzbekistan and Turkmenistan and the state retains considerable power to influence land use. In Uzbekistan the degrees of operational autonomy are greater than in Turkmenistan, although full private land ownership is absent in both.
- Differences in cotton marketing were clear by the mid-1990s when farmgate prices were substantially lower in Uzbekistan or Turkmenistan than in the Kyrgyz Republic, Tajikistan or Kazakhstan. In Uzbekistan, Turkmenistan and Tajikistan rents from cotton provide a significant share of state revenues. Low prices have provided little incentive to produce cotton and for farmers close to the borders of Kazakhstan or the Kyrgyz Republic there is an incentive to smuggle cotton, reducing state revenue. In Tajikistan cash shortages have led to a crisis among cotton-growers.
- As part of their import-substitution strategies, both Turkmenistan and Uzbekistan have used land allocation and directed credit as well as other incentives to promote grain production. The strategy was successful in increasing grain production, but it foregoes the benefits of specialization and trade, which are substantial given the superior wheat-growing conditions in neighboring Kazakhstan.
- The livestock sector was more resilient in Turkmenistan and Uzbekistan during the 1990s than in Kazakhstan, partly because of the greater operational stability of established large production units and slower reform and helped also by milder climates, so that the higher post-independence prices for fodder and fuel were less harmful. On the other hand, the less regulated livestock sectors in the Kyrgyz Republic and Kazakhstan have shown greater flexibility and potential for growth in recent years.
- In sum, distortions and resource transfers out of agriculture have been much greater in Turkmenistan and Uzbekistan than in the Kyrgyz Republic or Kazakhstan, with Tajikistan (the country with the least agricultural land per capita in Central Asia) in an intermediate position.

Distortions to Agricultural Incentives in Tajikistan, Turkmenistan and Uzbekistan

Richard Pomfret

Introduction and summary

This chapter compares the distortions to agricultural incentives in Tajikistan, Turkmenistan and Uzbekistan. Kazakhstan and the Kyrgyz Republic are dealt with in separate chapters, but will be frequently mentioned here as points of comparison. Although shared history and culture make the five Central Asian countries a natural group for comparison, they differ substantially in size and income levels (Table 1), as well as in the composition of their agricultural sectors and other resource endowments. The significantly higher GDP of Kazakhstan and Turkmenistan reflects their abundant oil and gas.¹ In all five countries the rural economy is important, and in four of them the majority of the population is rural (Kazakhstan being just below at 44 percent in 2000-04).

Central Asian agriculture divides into two distinct parts. In the steppe and mountain regions the traditional pastoral nomadism has long been under pressure, and the Virgin Lands campaign begun in the late 1950s brought large areas of non-irrigated land in northern Kazakhstan under grains. In the southern part of Central Asia, the area watered by the two great rivers which flow into the Aral Sea contains fertile oases, but farming has been constrained by the region's aridity and scarcity of water; under Russian Tsarist and Soviet leadership the irrigated areas were extended and became dominated by cotton. This division does not exactly match national boundaries (Table 2). Non-irrigated farming and pasture is dominant in Kazakhstan and in the northern parts of the Kyrgyz Republic. In Uzbekistan (the most populous Central Asian country), Turkmenistan and south-western Tajikistan cultivation is overwhelmingly on irrigated land. The southern half of the Kyrgyz Republic and South Kazakhstan are more similar to this southern pattern than to the steppe and mountain regions of their countries.

¹ The reliability of data is an issue throughout this region, but, apart from the war years in Tajikistan, the statistical situation is clearly worst in Turkmenistan. Where figures quoted in Tables are from international institutions, it is important to stress that, while these organizations adjust data for definitional consistency, the raw data come from national sources and international organizations have no way of correcting undisclosed collection or reporting biases.

Livestock farming is significant in all of the Central Asian countries. Following the enforced sedentarization of the Stalin era, traditional transhumance patterns disappeared and animals were concentrated on state farms, often dependent on externally supplied winter fodder. With the breakdown of the Soviet economic system and the concomitant reduction in subsidized transport and fuel for heating, livestock farming became increasingly concentrated on smallholdings or farms close to urban centers.

National policies and economic performance have differed greatly since the five countries became independent at the end of 1991 (Table 3). The Kyrgyz Republic undertook the most rapid and thorough transition from central planning, becoming in 1998 the first former Soviet republic to join the World Trade Organization. Establishing the institutions necessary for a smoothly working market economy has, however, been difficult and economic performance has been disappointing, especially in the more densely populated rural south, where the protests began which led to the March 2005 “tulip revolution”. Kazakhstan has been fairly reformist, although less consistently than the Kyrgyz Republic. Its economic performance was disappointing in the 1990s, but since the end of the decade that economy has boomed, led by soaring oil exports.

Uzbekistan adopted a more gradual economic transition strategy and during the 1990s enjoyed the best economic performance of all former Soviet republics. However, after the reimposition of foreign exchange controls in 1996 reforms slowed, and since the turn of the century Uzbekistan has lagged behind other countries in the Commonwealth of Independent States (CIS) in terms of economic growth rates. Turkmenistan is the least reformed economy in Central Asia, with an extremely personalized regime committed to national autonomy and minimal change.² Although their comparative advantage in gas and cotton makes them export economies, both Turkmenistan and Uzbekistan have adopted import-substitution strategies and provide substantial incentives to their farmers to grow more wheat and hence reduce dependence on imports, even though conditions are less favorable than in Kazakhstan to such cropping patterns.

Tajikistan is the only Central Asian country which did not enjoy a peaceful political transition to independence. The civil war which lasted until 1997 rapidly destroyed central planning mechanisms, but created a legacy of poor governance. Although the government’s stated policies are reformist, implementation is often weak. Tajikistan’s economic

² The situation after the death of President Niyazov (also known as Turkmenbashi the Great) in December 2006 was unclear at the time of writing.

performance during the 1990s was disastrous and it now ranks among the poorest countries in the world.

The first section of this chapter examines in greater detail the five countries' national policies as they affect agriculture.³ The next two sections deal with the two dominant crops, cotton and wheat, emphasizing the divide between the dirigiste regimes of Turkmenistan and Uzbekistan, which rely on rents from agriculture to bolster public revenues and which favor grains relative to cotton in order to increase food self-sufficiency, and the less interventionist regimes of Kazakhstan and the Kyrgyz Republic. The following section examines the livestock sector, before estimates of the size of the transfers from agriculture in the regulated economies of Turkmenistan and Uzbekistan are presented. An assessment of the distortions faced by farmers in Tajikistan, Turkmenistan and Uzbekistan is presented, before the final section provides a summary and conclusions.

Patterns of national reforms⁴

Until the mid-1990s the Central Asian policy environment was dominated by the end of the Soviet Union and central planning, hyperinflation, and the collapse of living standards. It is difficult to identify, let alone quantify, microeconomic distortions faced by individual sectors. All five countries continued to use the Soviet ruble in 1992-3, and this constrained their freedom with respect to price reform and macroeconomic stabilization. All five followed the Russian price liberalization of January 1992, but they did so with differing degrees of enthusiasm and with varying numbers of exceptions. Turkmenistan and Uzbekistan in particular retained administered prices for a number of goods and services.

During the early 1990s, even with liberalized prices, the price mechanism only provided a limited signaling role because the countries were experiencing hyperinflation which masked changes in relative prices (Table 3b). Following the introduction of national currencies in 1993,⁵ the Kyrgyz Republic was the first to achieve macroeconomic

³ Greater details are found for Kazakhstan and the Kyrgyz Republic in Pomfret (2008a, 2008b).

⁴ For more detailed analysis, see Pomfret (1995, 2006).

⁵ National currencies were introduced by four of the countries in 1993: the Kyrgyz Republic in May and Turkmenistan, Kazakhstan and Uzbekistan in November, although Uzbekistan initially issued sum coupons which were converted into sum in July 1994. In Tajikistan, the Tajik ruble was introduced in 1995 and replaced by the somoni in 2000.

stabilization, followed by Kazakhstan and then Uzbekistan. Turkmenistan relied on price controls to contain open inflation, at the cost of creating high repressed inflation. Although inflation in Tajikistan dropped below 100 percent after the civil war ended in 1997, the government only really achieved macroeconomic control after 2001 when inflation was reduced below 20 percent.

Essentially all prices had been liberalized in the Kyrgyz Republic and in Kazakhstan by the mid-1990s, and the state order system had been abolished. Export taxes introduced in the initial post-independence period had been eliminated by 1995/6. Tariff schedules had low average tariffs and few peaks. In Tajikistan administered prices disappeared in the civil war, although competing groups vied for control over the country's two main foreign exchange earners (aluminum and cotton), and since the turn of the century this control has resided with the central government. By contrast, key prices including the exchange rate, remained controlled in Uzbekistan and Turkmenistan. Both of these countries used a state order system to extract rents from the agricultural sector, as well as to encourage diversification into wheat in the name of self-sufficiency. Farmers in Turkmenistan and Uzbekistan received well below world prices for the main crops, but also prices of inputs such as fertilizers or fuel were much lower in these countries.⁶ The price differentials led to smuggling both of inputs and of outputs such as cotton across poorly (or corruptly) monitored borders.

Throughout Central Asia land reform has been problematic, and actual developments are difficult to assess because of the gap between legislation and reality and because of the paucity of extensive fieldwork by researchers. In practice both Turkmenistan and Uzbekistan remain committed to tight state control over land and its use.⁷ In Turkmenistan the principle of private ownership is enshrined in Article 9 of the 1992 Constitution, but land may not be transferred and Turkmenistan's government retains the right to reallocate land if it is not being used efficiently; "private land ownership" in Turkmenistan means inheritable use-right subject to the will of the government – an almost meaningless use of the term "private" (Lerman and Brooks 1998, p. 175). In Uzbekistan, while private farming does not exist, there are degrees of operational autonomy, from the central state ownership of devolved state farms (*kolkhoz*), to joint-stock farms with collective

⁶ Fertilizer use collapsed elsewhere; ten years after the end of central planning, fertilizer use in Kazakhstan had fallen by 95 percent whereas in Uzbekistan it had fallen by only 40 percent (FAO data cited in Swinnen and Rozelle 2006, p. 22).

ownership (*shirkat*) to smallholder leased farms (*dekhan*).⁸ Tajikistan is sometimes seen as having land reform both *de facto*, because civil war destroyed the planned economy, and *de jure*, because of the distribution of land share certificates, but many farms remain under the administrative control of former state farm bosses and farms are subject to state control over planting and harvesting decisions, especially with respect to cotton.

True land reform in southern Central Asia is intimately linked to water. There is a general resistance to market-determined pricing of water, and in all countries farmers do not pay the full economic cost of water. Without water pricing and with often unclear property rights, the profligate use of irrigation water inherited from the Soviet era has continued and contributed to increased salinization, leading to substantial declines in agricultural yields and rural incomes.⁹ All across the southern part of Central Asia, the gap between formal and effective rules regarding irrigation has encouraged opportunistic behavior, which was exacerbated in the 1990s by the shortening of people's time horizons and low levels of trust; for example, the collapse of monitoring has led to piercing of irrigation channels to withdraw water illegally, especially in upstream areas. A positive farm-level response to degradation of the irrigation systems is difficult, and this is an area where public policy is necessary. The general picture, however, is of policy failure insofar as maintenance of irrigation systems has deteriorated all across southern Central Asia (World Bank 2002a).¹⁰ The authorities in Uzbekistan seem to have been effective in maintaining irrigation and other infrastructure, at least relative to the chaos of Tajikistan and the inefficiency of Turkmenistan.

Even apart from water, it is difficult to quantify subsidies to farmers. During the 1990s and early 2000s subsidized credit or debt rescheduling or write-offs were important, but often discretionary and non-transparent. Otherwise, actual cash subsidies are small. There is a general lack of transparency to the administration of the value-added tax, which may be less rigorously imposed (or widely evaded) by small farmers and which is in principle, but not always in practice, refunded on exports. Provision of inputs in kind or at low prices for

⁷ In their comparison of land reform processes in 28 formerly centrally planned economies, Swinnen and Rozelle (2006, p. 57) rank Uzbekistan and Turkmenistan among the three least-reformed (with Belarus).

⁸ Wall and Lamers (2004), reporting on fieldwork in Khorezm in 2003, describe the degrees of autonomy. More sweeping land reforms were introduced in Uzbekistan in 2003, but the privatization process is far from transparent (Spoon 2006, p. 189).

⁹ A supporting document for a World Bank project estimates that 70 percent of the irrigated land in Central Asia was affected by salinization, with national levels of 29 percent in the Kyrgyz Republic, 38 percent in Tajikistan, 66 percent in Uzbekistan, 80 percent in Kazakhstan and 97 percent in Turkmenistan (World Bank 2001).

¹⁰ Even in the Soviet era maintenance was neglected; according to reports summarized in World Bank (2002, vol.1, 5n), about half of the irrigated area of Uzbekistan, Kazakhstan and the Kyrgyz Republic was already in need of capital repairs in the early 1990s.

fuel, electricity, etc. remains the norm in Turkmenistan, but it has been drastically reduced in recent years in Uzbekistan and is less prevalent in Tajikistan. Delivery of extension services, veterinary support, etc. is often similar to in the Soviet era, although there has been drastic reduction in the availability of such services.

Cotton

Cotton is the most important crop in Central Asia. Indeed the timing of the incorporation of the area south of the steppe into the Russian Empire in the 1860s partly reflected fears of a cotton famine due to the US civil war. The cotton economy expanded during the Tsarist and Soviet eras, and especially rapidly after 1950 when major irrigation projects brought large new areas into cotton production at the cost of desiccating the Aral Sea, which had been the world's fourth-largest lake in 1960. The mechanization of cotton harvesting in the 1960s aimed at showing the Third World how modernization was occurring in the poorest part of the USSR. Acreage sown with cotton in Soviet Central Asia in 1988 was 3,133 thousand hectares, of which 2,017 was in the Uzbek republic, 636 in the Turkmen republic, 320 in the Tajik republic, 128 in Kazakhstan and 32 in the Kyrgyz Republic (Lewis 1992, p. 144).

Since independence the acreage sown with cotton, production of seed cotton and the gins' output of baled cotton have shown diverging patterns: growth in Kazakhstan and the Kyrgyz Republic, decline in Turkmenistan and Uzbekistan, and Tajikistan somewhere in between (Table 4). In Turkmenistan the cotton harvest fell from 1.4 million tons in 1991 to 435,000 tons in 1996. The years 1996-8 also saw relatively poor harvests in other regions (reflected in low output in Kazakhstan and the Kyrgyz Republic in Table 8a), but the extent of the subsequent recovery in Turkmenistan is dubious. In Tajikistan the war years were associated with a large decline in the area sown and output of cotton until 1996 and then a recovery back to pre-war levels by 2003. In Kazakhstan and the Kyrgyz Republic, by contrast, both the acreage planted with cotton and cotton output have increased substantially (Tables 4 and A1).¹¹

¹¹ The cotton output data need to be treated with caution due to widespread smuggling. There is much anecdotal evidence of cotton being smuggled from Turkmenistan and Uzbekistan to Kazakhstan or the Kyrgyz Republic to avoid the former countries' state marketing systems and from Tajikistan to the Kyrgyz Republic where the ginning sector is more competitive. An indirect indicator of such flows is the volatility of the ginning outturn

In 1990, according to data from the International Cotton Advisory Committee, Uzbekistan was the world's second-largest cotton exporter (397,000 tons) and Tajikistan the fourth-largest (200,000 tons). Cotton was also a significant export for Turkmenistan and was regionally important for the southern part of the Kyrgyz Republic and for South Kazakhstan. In the Soviet era much of the cotton went to cotton mills in the Russian republic, and the cotton which was sold on world markets went through centralized foreign trade agencies. After 1991 the Central Asian countries controlled their exports of cotton, which was readily sold through international brokers, such as Paul Reinhart in Winterthur, Switzerland, or Cargill in Liverpool, England. Cotton's portability and high value to weight ratio meant that it could be transported by rail or air, making it an almost uniquely attractive source of foreign exchange during the early transition years, and one which could be easily tapped by governments.

Cotton exports remain of great importance for the southern Central Asian countries, accounting for 6.5 percent of GDP in Uzbekistan, 8.2 percent of GDP in Tajikistan and 3.6 percent of GDP in Turkmenistan (Baffes 2004, p. 36), but post-independence performance has varied greatly. Despite falling harvests, Uzbekistan increased its supplies to the world market, reaching a peak of 900,000 tons exported in 1998 and in 1999. In 2002 Uzbekistan was still the world's second-biggest cotton exporter (with 717,000 tons), but Tajikistan had slipped to ninth (147,000 tons). Poor management and diversion to domestic textile mills have dramatically reduced Turkmenistan's cotton exports to the point that they are now lower than Kazakhstan's (Table 5).

One drawback of cotton dependence is the volatility of world prices (Figure 1). In January 1992 the world price of cotton was \$1.31 per kilogram. In May 1995 the price peaked at \$2.53, but it dropped to \$1.66 by October 1996 and the price continued to fall until it bottomed at 82 cents in October 2001. Two years later the world price had doubled, but it then fell by about a quarter in the 2004-5 harvest season. The volatility largely affects government revenues in Uzbekistan and Turkmenistan, because the state order systems insulate farmers from world price movements.

data in Table 4, which suggest that gins in Kazakhstan were receiving imported cotton between 1996, when Uzbekistan introduced exchange controls, and 2001 or 2002 when Uzbekistan tightened monitoring of its border with Kazakhstan. Similarly, peaks in ginning outturns in the Kyrgyz Republic in 1997 and since 2001 imply inputs greater than domestic production of seed cotton. Sadler (2006, p. 87) notes that in Uzbekistan "The statistics are also likely to be inaccurate, as they are more driven to meet with government targets than a true reflection of production. They are also inflated by the inclusion of cotton that is not of merchantable quality". The million ton harvests in Turkmenistan in 2004 and 2005 (Table 8a) are even less credible than the Uzbekistan data; Tuxhatullin (2005) reports an actual harvest of 723,000 tons in 2005.

A second drawback of cotton dependence is the prospect that world prices may be in secular decline. The nominal price per kilogram was lower in January 2002 than in January 1952 (96 cents versus \$1.05). Given the price volatility the nominal price comparison is of course sensitive to choice of dates, but it is indisputable that in real terms (eg. relative to the price of manufactures) cotton prices have declined substantially over the last half century. Part of the decline is due to tastes and technology as artificial fibers have challenged cotton and as genetically modified cotton has raised the productivity of cotton-producers in the USA, Australia and China (Anderson, Valenzuela and Jackson, 2008). Part, however, reflects policy decisions in high-income countries which provide huge subsidies to cotton producers.¹² Cotton prices have also been depressed by rich countries' policies towards imports of textiles and clothing.¹³

In analyzing the distortions of incentives within Central Asian countries the salient difference is between the highly regulated cotton sectors of Turkmenistan and Uzbekistan and the less regulated markets in the other three countries. The governments of Uzbekistan and Turkmenistan have kept control over the cotton sector as a source of rents which contribute substantially to public revenues. In Kazakhstan and the Kyrgyz Republic the cotton sector is essentially market driven, although the details vary and the situation is still evolving. Tajikistan has some features of the market-driven cotton sectors, but the government extracts substantial rents. The simplest measure of these distortions is the gap between border prices and farmgate prices (estimated below), but the situation is complicated by the differing treatment of inputs, which are far cheaper in the more regulated systems. The

¹² This has been especially true since 1985 in the USA, when the policy shifted from stockpiling to price supports, and since Greek and Spanish accession to the European Union in the 1980s. The International Cotton Advisory Committee estimates that in 2001/2 direct assistance to cotton production amounted to \$2.3 billion in the USA and \$0.8 billion in the EU; US producer prices were 91 percent higher than world prices, and in Greece and Spain the producer prices were 144 percent and 184 percent above world prices. Estimates of the effects of removing these production and export subsidies go as high as a 71 percent increase in cotton prices (using 2001/2 as the base year), and a 6 percent increase in the volume of Uzbekistan's cotton exports (Baffes 2004, pp. 18-19). Charan, Lawrence and Watkins (2006, p. 281) give even higher estimates of support for cotton producer in the USA and EU in 2001/2, but with lower support in 2002/3. A more recent economy-wide study suggests if all cotton subsidies and import trade barriers globally as of 2001 were removed, international prices of cotton would be 13 percent higher on average (Anderson and Valenzuela 2007, p. 1290).

¹³ The Multifiber Arrangement (MFA) and its successor the Agreement on Textiles and Clothing (ATC) took these products outside WTO-rules and allowed substantial trade barriers to persist, which not only reduced demand for textiles and clothing and hence demand for all fibres covered by the ATC, but also discriminated against cotton relative to other fibres. Will Martin estimated in 1996 that the MFA imposed an implicit tax of 20 percent on cotton relative to other fibres, and that ending the MFA would increase the world price of cotton by 4 percent (quoted in Baffes 2004, p. 18). These arrangements were phased out as part of the 1994 Uruguay Round agreement, but the process was back-loaded and was only completed at the end of 2004 with some exceptions (most notably for China) continuing until 2008.

existing literature (reviewed below) has focused on estimating the net transfers out of agriculture in the regulated systems.

Turkmenistan and Uzbekistan retained state procurement systems for cotton, while the Kyrgyz Republic eliminated state procurement in 1992 and Kazakhstan and Tajikistan did so in the mid-1990s. This was reflected in substantial differences in farmgate prices. Converting the local currency price of cotton for the 1997 harvest season into US dollars, the prices received by farmers in Kazakhstan (\$349), Tajikistan (\$388) or the Kyrgyz Republic (\$394) were not far from the average border parity price in Central Asia, estimated by Goletti and Chabot (2000, p. 55) at \$404 per ton. The US dollar equivalent at the official exchange rate of the price received by farmers in Turkmenistan (\$240) or Uzbekistan (\$242) from the state purchasing agencies was substantially lower (Table 6).

The gap between the world price of cotton and prices received by cotton farmers in Uzbekistan and Turkmenistan was exacerbated, and made less transparent, by the existence of foreign exchange controls. Uzbekistan introduced strict forex controls in October 1996 and the black market premium subsequently widened; at the parallel exchange rate the local currency price in Table 6 of 14,750 sum per ton translates into \$105 per ton, or about a quarter of the border parity price. The burden of the overvalued exchange rate, represented by the gap between domestic and world prices at an equilibrium exchange rate, increased in the remainder of the 1990s.¹⁴ Turkmenistan's black market premium only became substantial in 1998 so that the effect of forex controls is less great in Table 6, but it became a major source of price distortion after 1997. The procurement price in Turkmenistan, calculated at the official exchange rate of 5,200 manat/\$, was cut from \$240 in 1997 to \$192 in 1998 and 1999 (Guchgeldiev 1999, p. 34). By the end of 1998 the black market rate was 15,000 manat/\$; at this exchange rate the procurement price translated into less than \$70 per ton.¹⁵

In the more regulated systems of Turkmenistan and Uzbekistan, farmers receive subsidized inputs and appear to benefit from more reliable supply of seed and fertilizers. Table 7 illustrates the differences in fertilizer prices in the mid-1990s. Seeds are also cheaper in Uzbekistan, and perhaps of better quality due to public maintenance of agricultural

¹⁴ According to National Bank of Uzbekistan data (reported in Akimov 2007, Table 8.4), the black market premium for cash dollars, which had been 13 percent at the end of 1995, jumped to 136 percent at the end of 1996, stabilized at 125 percent in 1997 and then rose to 264 percent in 1998 and 471 percent in 1999, before narrowing to 177 percent in 2000 and practically disappearing in 2003. The reduction in the premium was largely achieved by an increase in the official exchange rate from 140 sum/\$ in 1999 to 980 in 2003 while the black market cash rate depreciated from 800 to 1000.

¹⁵ The official rate remained pegged around 5200, but by 2006 the street rate was around 25,000 manat per dollar, but this was in a thin market, so it is impossible to even guess at an equilibrium exchange rate.

research facilities. While that offers incentives to smuggle inputs from Turkmenistan and Uzbekistan to neighboring countries, which can benefit the farmers involved, it is inefficient in terms of regional social welfare.

Although evidence on maintenance of irrigation systems is difficult to come by, farmers in Uzbekistan and perhaps Turkmenistan may benefit from better-managed irrigation systems than farmers in the Kyrgyz Republic or Tajikistan.¹⁶ However, efficiency of water use does not appear to differ much among the Central Asian countries, apart from war-torn Tajikistan, and all five countries' cotton sectors appear to be wasteful of water relative to cotton-growers elsewhere; in 1996-8, kilograms of seed cotton produced per thousand cubic meters of water used were 309 in Kazakhstan, 230 in the Kyrgyz Republic, 125 in Tajikistan, 256 in Turkmenistan and 273 in Uzbekistan, which are all much lower than in other cotton-producing countries, e.g. 462 in Syria, 487 in California, 610 in Australia and 1027 in Greece (Goletti and Chabot 2000, p. 62). Farmers in Turkmenistan and Uzbekistan also benefit from advanced interest-free partial payments, although it is unclear how promptly these and the final payments are made available and the extent to which farmers are free to use monies credited to their bank accounts.¹⁷

Full assessment of the distortions affecting cotton production is complicated by lack of information about harvesting techniques. In the Soviet era cotton mechanization was used as a propaganda tool to illustrate how the Communist system was modernizing agriculture in the Soviet Union's less-developed regions. In practice much of the picking was still done by hand, using students and other groups who were mobilized during the harvest season. Given relative factor scarcities it seems unlikely that mechanization of cotton-picking has ever been efficient in labor-abundant Central Asia (Pomfret 2002). Since independence the share of the cotton harvest picked by machine has declined substantially as farms are unwilling to purchase new machines, and they even appear to let existing machines stay idle because the benefits do not even cover the running costs.¹⁸ In Turkmenistan, Uzbekistan and Tajikistan

¹⁶ A World Bank field report on Uzbekistan (Thurman and Lundell, undated) observed that in the five rayons surveyed, little maintenance had been carried out in the three years before 2000 and that, as a consequence of dysfunctional drainage systems, salinization had become a major problem. The situation appears to be even worse in Turkmenistan, Tajikistan and the Kyrgyz Republic than in Uzbekistan. In the Kyrgyz Republic and Kazakhstan institutional reforms have decentralized maintenance to farms who cannot afford it. Addressing the drainage problem in Turkmenistan by construction of a huge artificial lake in the desert has been widely condemned on environmental grounds.

¹⁷ One difficulty with quantifying the situation in Turkmenistan and Uzbekistan is the discretionary power of public officials, who can accelerate or hold up payments to individual farmers.

¹⁸ One reason why people accept the back-breaking work of cotton-picking in Uzbekistan is that they are paid in cash immediately, unlike payment for crops which can be delayed for months or be paid into restricted-access

the Soviet-era practice of forced labor is maintained to varying degrees (ICG 2005, pp. 18-25).¹⁹

The market-based cotton sectors and Tajikistan

Market reforms proceeded fastest and furthest in the Kyrgyz Republic. One consequence was the rapid expansion of the number of cotton gins from three at the end of the Soviet era to twenty-three in 2005, at least nine of which were built after 1999 (Sadler 2006, p. 98).²⁰ The ginners play a key role in providing finance to cotton producers, initially raised from international sources and since 2000 largely from their own resources. The farmer contracts to deliver seed cotton to the gin in return for local currency advances to pay for inputs and labor. Initially the gins offered a local currency price, bearing all the exchange rate and world price risk, but in recent years prices have been pegged to the Cotlook A world price index.

Similar developments took place in Kazakhstan, although the increase in gin numbers (to 15) occurred after 2000. The gins are the main source of finance for cotton producers, and the contracts are similar to those described for the Kyrgyz Republic apart from the fact that some inputs are supplied by the gins. There are complaints of overcharging for inputs supplied by gins in Kazakhstan, whereas in the Kyrgyz Republic many inputs are smuggled from Uzbekistan where they are subsidized. Nevertheless, the overall position of the cotton farmer seems to be better in Kazakhstan. Sadler (2006, p. 99) reports average prices received by farmers for seed cotton in 2003 as \$450 per ton in the Kyrgyz Republic

bank accounts. They are, however, paid more in southern Kazakhstan, where a skilled picker could earn 20,000 tenge (\$135) a month in the 2002 harvest season by picking 100 kilos a day (wages in Uzbekistan were as low as 25 sum per kilo, or \$2 per 100-kilos, according to ICG, 2003, 13), and this has led to substantial illegal temporary immigration from Uzbekistan.

¹⁹ According to ICG (2005, p. 35) the use of forced labor does not reflect labor shortage, but rather the power of vested interests aiming to maximize net revenue from cotton sales and having the power to force children, students and others to work for practically nothing. The extent of child labor is difficult to document in the face of official statements that forced labor is illegal, but some children help their parents in the fields. Cannell (2005) cites UNICEF estimates that 23 percent of 5-14 year olds, or 1.4 million children, are annually sent to the cottonfields in Uzbekistan. University students complain that not only are they required to provide unpaid labor, but an unreasonable portion of their low student stipends is kept by the farm managers for food and accommodation costs.

²⁰ Most of these new plants use second-hand equipment, either re-sited from other former Soviet republics or roller gins from Turkey.

and \$550 in Kazakhstan.²¹ He explains the difference by the monopsony power of Kyrgyz gins and a more competitive situation in Kazakhstan. This gap probably narrowed in 2005 following the formation of an informal cartel among the gins in Kazakhstan.

Tajikistan occupies an intermediate position between the controlled and the market-based systems. The government is involved at all levels of the production chain, and takes a substantial share of the rents for the public budget. All cotton exports have to be registered with the Tajik commodities exchange, which regulates the price according to a set formula that leads to underpayment by about \$80 per ton; on exports of 150,000 tons, this transfers \$12 million a year from the cotton sector to the government. A ten percent tax on exported cotton raises revenue and gives the government an incentive to maximize exports. Although land has been notionally privatized, the continued existence of national targets for cotton output, which are implemented by regional officials, means that farmers have little choice about growing or not growing cotton; failure to follow the local authorities directives will lead to revocation of use rights by the local official who has the power to determine whether land is being properly used. This and other measures, however, undermine farmers' incentives to produce.²²

Until 1996 state credits caused severe problems for the government budget, and in 1997 the Swiss cotton broking firm Reinhart provided a \$70 million loan to be repaid in future cotton deliveries. Starting in 1998 financing of cotton was controlled by a local bank (AIB/KreditInvest) in conjunction with Reinhart (ADB 2002). Although independent middlemen operate in Tajikistan, Sadler (2006, p. 83) claims that Reinhart controlled over 80 percent of cotton exports in the early 2000s. The gins were privatized in 1998, but the state still holds shares in 15 of the 20 gins, and each gin operates as a monopsonist in a clearly delineated area – a situation which appears to be enforced by regional officials.²³ Thus, despite the difference in marketing channels compared to the Uzbekistan or Turkmenistan, the various levels of government in collaboration with a leading international broker conspire to extract rents from cotton farmers in Tajikistan.

²¹ The averages mask regional variations, eg. Sadler reports that the price was \$75 higher in Jalalabad than in Osh (the two cotton-producing oblasts in southern Kyrgyzstan), which may be due to market conditions or to quality differences.

²² In 2005 and 2006 the targets were not fulfilled in any province (*oblast*). The national cotton target in 2005 was 610,000 tons, but output was 447,918 tons, and in 2006 the target was 547,000 tons and actual output was 440,245 tons (Ministry of Agriculture and Environmental Protection official data).

²³ Monopoly power reduces the gins' incentives to raise efficiency (reflected in the abysmal ginning outturns in Table 4). In Kazakhstan or the Kyrgyz Republic improved ginning efficiency is part of the competitive

At the microeconomic level, relations between farmers and “investors”, who are usually gin owners, are similar in Tajikistan to the situation in Kazakhstan or the Kyrgyz Republic, but the farmers’ bargaining position is much weaker. Lack of cash has meant that farmers have been forced to provide a lien on their crop in return for inputs, and facing local monopolies they cannot turn to competing suppliers of inputs or of services.²⁴ Physical inputs are supplied as part of the financing package, and there are frequent complaints of inflated prices, low quality and late delivery. One consequence has been a large drop in seed and crop quality.²⁵ In the absence of any pressure for gins to offer good prices, farmers receive low net prices for their cotton. Swinnen, Sadler and Vandeplass (2006, Table 6.2) report a 2003 price of \$165 per ton in Tajikistan, far below the \$550 in Kazakhstan and \$450 in the Kyrgyz Republic, and even below the \$200 received by farmers in Uzbekistan.

The regulated cotton sectors of Uzbekistan and Turkmenistan

The state-controlled markets in Uzbekistan and Turkmenistan are a two-tier market system to transfer resources from the farm sector to the state budget.²⁶ Figure 2 presents a simple partial equilibrium model of such a system. Assuming a perfectly elastic demand for exports (D_w) at the world price (P_w) and given the domestic supply and demand curves (S_d and D_d), the free market outcome would involve production of OQ_2 , domestic sales of OQ_1 and exports of Q_1Q_2 . With a controlled price (P_c) on a specified output (OQ_3) and a higher market-related price on additional output, then as long as farmers receive the world price for their extra output the outcome will be the same level of output, domestic sales and exports as in the free market outcome. The only difference between these two outcomes is that the dual-

environment, because for any world price for baled cotton the higher the outturn the higher the price that the gin can offer farmers for seed cotton.

²⁴ Farm debts accrued since 1997 (estimated by the ADB at \$180 million in September 2004 and reported by the government to be around \$280 million in early 2006) add to the problem because no independent financier will lend to indebted farms. The crisis of Tajikistan’s cotton sector is often viewed as a debt crisis, but the burgeoning debt is a symptom of structural flaws rather than the heart of the problem (*Priorities for Sustainable Growth: A strategy for agriculture sector development in Tajikistan*, World Bank/SECO joint report, May 2006).

²⁵ In the early 1990s Tajik cotton was considered to be the best quality in Central Asia, but since 1997 it has not been in demand from high-quality spinning markets and has traded at a discount to, say, Uzbek cotton. This is due to lack of staple length uniformity (most likely because of low seed quality), to high trash content because pickers have little incentive to take care (and may be trying to increase the weight delivered to gins) and because gins’ grading and pricing policies are related to color rather than trash content, and to poor baling. The presence of a single international buyer may also have blunted incentives to maintain quality.

²⁶ The following analysis (from Pomfret 2000) is of Uzbekistan’s cotton sector, but qualitatively the Turkmenistan system is similar.

pricing mechanism transfers $(P_w - P_c) \cdot OQ_3$ from farmers to the government; the tax rate is determined by the values of P_c and Q_3 . If the demand and supply curves capture social as well as private benefits and costs, then both outcomes are efficient, and only differ in their distributional patterns.

The cotton market in Uzbekistan and Turkmenistan diverges from the basic dual-pricing model due to three distortions: preferential prices for the domestic textile industry, subsidized inputs for cotton producers, and directing practically all output through the state marketing system.

Part of cotton output has been reserved for domestic mills at a price (P_d in Figure 2) below the world price. Subsidizing domestic mills through lower cotton prices stimulates domestic cotton sales, by Q_1Q_4 relative to the free market outcome, with an equal decline in cotton exports. Artificially low cotton prices for domestic mills reduces the government's revenue from the cotton tax by the area (P_wbcP_d) , but the benefit to the mills (P_wacP_d) is less than this amount and there is an uncompensated loss to the nation, measured by the shaded triangle abc , from overexpansion of the textile industry.²⁷ There is no direct impact on farmers, who receive price P_c on the OQ_4 units, whether the cotton ends up in domestic or foreign mills.

The subsidization of inputs shifts cotton-growers' supply curve to the right. Whether the incentive to grow more cotton increases or decreases national welfare depends primarily on whether output is close to OQ_2 or to OQ_5 . In the free market or the pure dual-pricing model, the optimum output (OQ_2) is achieved and input subsidies will induce undesirable overexpansion of cotton output. In Turkmenistan and Uzbekistan, where many marginal decisions are based on the controlled price of cotton and output may be suboptimal, input subsidies may be a correcting distortion in the cotton sector, although they may create undesirable distortions in the input markets.

²⁷ In Uzbekistan P_d was less than half of P_w in 1992 (Connolly and Vatnick 1994, p. 209). In 1998 one seventh of the cotton output went to domestic mills and the rest was exported. By 2001 the costs were being acknowledged and the government indicated a shift to a less dirigiste industrial policy. Bravo and Crole-Rees (2005, p. 10) report that 10-15 percent of cotton production in 2000-4 was allocated to the local textile industry at a price discounted by 15-30 percent. By 2005 the discounted internal price for cotton had been eliminated, leading to the bankruptcy of several textile companies which had relied on the subsidized input. In Turkmenistan, promotion of the textile industry was less extreme in the early 1990s, but the distortion became larger as funds were used in the late 1990s and early 2000s to build up a substantial cotton textile and apparel industry; by the end of 2000 this industry was absorbing a third of the cotton crop and probably had negative value-added at world prices (Pomfret 2001).

Finally, practically all farmers' cotton output has been sold through state orders at the controlled price, with no sales at a price above P_c .²⁸ Thus, Q_3 is so far to the right as to be irrelevant and farmers' revenue is a rectangle with height OP_c , rather than a lazy-L with higher marginal revenue on units Q_2Q_3 . This is important not only because of the distributional outcome, but also because output decisions are made at the margin. If all output is sold at a price P_c , then farmers will cut back supply from the free market or dual-pricing level, OQ_2 , to OQ_5 ; the value of output is cut by $(Q_2Q_5) \cdot P_w$, government revenue is lower, farmers' income is lower, and there is a deadweight loss represented by the triangle ghj , with a national welfare loss (ghj) on foregone exports.

How large are the distortions caused by the two-tier pricing system? In Figure 2, a uniform tax ($P_w - P_c$) on all output will reduce supply as well as transferring resources from farmers to the state, or cotton users. The literature, which has focused on measuring the transfers, is reviewed in Section 5 below. The less easily quantifiable consequences of punitive taxation of an export crop are the long-run loss of sales and encouragement of illegal economic activities.

There is considerable international evidence that the negative supply response to state marketing of crops like cotton or cocoa is small in the short-run, when the rents are a ready source of government revenue, but becomes larger. Just how big these costs could be in Uzbekistan or Turkmenistan is difficult to estimate, because we do not know where exactly cotton output now is along the horizontal axis of Figure 2. If the supply elasticity of 1.5 used by Connolly and Vatnick (1994) for Uzbekistan is close to the true long-run value, then their 1992 data for P_w and P_c imply that the cotton output associated with a long-run price P_c would be zero! While implausible as the actual outcome, such a calculation is suggestive of how serious the supply response could be.

The policies of rent extraction provide incentives for smuggling cotton to neighboring states with freer markets. In the early 2000s there were frequent reports of cotton being smuggled over the porous border between Uzbekistan and Kazakhstan or the Kyrgyz Republic, where agricultural prices are less repressed.²⁹ Subsidized input prices have also

²⁸ In Uzbekistan's state order system the percentage of the two main crops which must be sold to the state was gradually reduced during the late 1990s. However, if a farm produced less than its target output for cotton, then the entire crop had to be sold through the state order system. With the long-term decline in cotton productivity, this was a common outcome.

²⁹ Early reports of smuggling between Uzbekistan and southern Kazakhstan are cited by Pomfret (2000, p. 278), and extensive smuggling from Uzbekistan to the Kyrgyz Republic in 2003-4 is reported in ICG (2005, p. 5). Sadler (2006, p. 87) cites Uzbek government estimates of 300,000 tons of seed cotton per year being smuggled to Kazakhstan and the Kyrgyz Republic, although he rejects this as improbably high.

stimulated smuggling of fertilizers from Turkmenistan to Kazakhstan (Lerman and Brooks 2001), and of cotton seeds and other inputs from Uzbekistan to Kazakhstan and the Kyrgyz Republic (Sadler 2006). The consequences for supply and recorded output are visible in the poor performance of Uzbekistan's and Turkmenistan's cotton sectors since independence, while smuggling incurs evasion (and monitoring) costs and undermines the rule of law.

In Uzbekistan, transfers from the cotton sector to the state budget have been large ever since independence, and played a crucial role in the government's ability to cushion the transitional recession and maintain public expenditures during the 1990s. In Turkmenistan the farm sector is even more tightly controlled, but it is secondary to natural gas as a source of revenues. In both countries, the ability to transfer rents from farmers to the state has declined due to negative supply responses. Estimates of the magnitudes of these transfers and of the distortions facing farmers in the two countries are presented in Sections 5 and 6 below.

There have been some potentially significant reforms in Uzbekistan in 2004/5, although it is difficult to assess their impact.³⁰ According to Sadler (2006, p. 94) prices for all inputs other than fuel are now close to world prices, while provision of services such as agronomic advice continues to follow the Soviet pattern. Uzbekistan has a record of circumventing announced liberalization measures by restrictions in their implementation; for example, since the official rescinding of foreign exchange controls in 2003 restrictions on access to foreign exchange accounts or foreign currency have continue to exist, although there has been a closing of the black market. In the cotton context, Sadler (2006, p. 92) concludes that "Potentially we might be on the verge of fundamental reform of the sector, although previous experience with non-implemented reforms have left most commentators cynical about government commitment to real reform in any area of the Uzbek economy."³¹

Grains

³⁰ In 2004 state procurement prices were increased over those for 2003, but world market prices fell during 2004-5 (Figure 1). The gap between farmgate and world prices in 2005 was dominated by the fall in world prices; independent of any policy change, distortions became smaller quantitatively.

³¹ After the Andijan events of May 2005, the government appears to have turned even more to control rather than reform of the economy, including stricter control of the borders with the Kyrgyz Republic and Kazakhstan, in part to curtail cotton smuggling. In October 2006 President Karimov dismissed Saidullo Begailiev, the governor of Andijan province, which was falling below its target cotton output. The causality is, however, unclear in that Begailiev's dismissal for his role in the Andijan massacre had been rumoured for over a year, which may have distracted him from making proper arrangements for the 2006 cotton harvest, which in turn may have given Karimov the pretext for removing the governor without formal admission of any government

Kazakhstan is the largest wheat-producer in Central Asia, with a 2005 harvest of over eleven million tons, and the only major grain exporter. The volatility of harvests makes it difficult to identify trends, but the pattern is of declining output in the 1990s and a substantial recovery since 1999. This reflects policies, described in the Kazakhstan country study, of large pro-farming distortions up to 1991, followed by neglect of agriculture (probably with a negative net incentive) during the 1990s, and then by a more positive policy attitude after 1999.

Absent high trade costs, Kazakhstan could produce sufficient grain to feed all of Central Asia, and wheat grown in the cooler climate of northern Kazakhstan is of higher quality than wheat grown elsewhere in Central Asia.

In the Kyrgyz Republic there is no policy distortion in favor of wheat, but import substitution was encouraged in the mid-1990s by the disruption of supplies from (or through) Kazakhstan.³² In 1993 the Kyrgyz Republic imported 455,702 tons of wheat, but this had dropped to 84,116 tons in 1995. Wheat output in the Kyrgyz Republic doubled from 0.6 million tons in 1994 and 1995 to over 1.2 million tons in 1997 and 1998, and it has remained over a million tons since then (Table 8a). Despite lower profitability of wheat production relative to vegetables in the north or cotton in the south, farmers value the lower risk associated with wheat, which is not perishable and whose domestic price is relatively stable.

In both Turkmenistan and Uzbekistan public policy has promoted grain production as part of a broader import-substitution strategy and also to increase food self-sufficiency. The limited evidence suggests that this is done by making relative prices (or payment policies) more attractive to wheat-growers, but within a context of net distortions which penalize all farmers. In Uzbekistan, according to Thurman and Lundell (undated, p.2, presumably referring to c.2000), the gap between world market prices and the (actual) farmgate price for cotton was about 70 percent, for wheat almost 60 percent, and for rice over 50 percent.³³

fault at Andijan. Begailiev's successor, a police chief from Namanjan, arrived too late to affect the cotton harvest, but there was a clampdown on smuggling the crop across the Kyrgyz border.

³² During the 1990s food aid and a 1997 regulation allowing duty-free import of one ton of flour or two tons of wheat (suspended in 2002) operated as negative incentives to domestic wheat production. In 2002 the government introduced a seasonal (August-December) 20 percent tariff on imported wheat.

³³ Farmers try to bypass the state marketing channels (for milk and meat, as well as for grains) and sell directly in local bazaars where prices are higher, but crackdowns on the bazaar-traders in 2002 and 2004 have curtailed this option, and in practice constraints on marketing to state-owned mills leave farmers with few options. Wall and Lamers (2004, p. 17) report that the farmers whom they surveyed in Korezm (Uzbekistan) in 2003 only received about 150 sum per kg (15 US cents at the market exchange rate) for their wheat; in Kazakhstan farmgate prices in 2003 were 12.1 tenge (81 cents) per kg.

Thus, although all farmers face negative incentives, producers of wheat and rice are penalized less than cotton-growers.³⁴ In both Turkmenistan and Uzbekistan, and to a lesser extent in Tajikistan, price signals are ultimately less important than administrative decisions about land use taken by the government and enforced at the local level.

The effectiveness of policies to promote wheat production in Turkmenistan and Uzbekistan is apparent in Table 8a, which shows dramatic increases in wheat production since independence. Directed allocation of irrigated land was crucial in Turkmenistan and also important in Uzbekistan, but there are also factors, apart from the price differential, which make wheat more attractive relative to cotton for farmers in Uzbekistan. Half of the wheat crop is sold at the state purchase price and a further proportion, determined near harvest time, is sold at a negotiated price which is typically about 20 percent above the state purchase price. The selling regime for wheat makes it easier to obtain cash for some sales, while cotton farmers are severely cash-constrained unless they engage in smuggling. Wheat also allows a second crop to be grown, which most likely would be vegetables which are relatively profitable and easily marketable.

In Turkmenistan, for wheat as for cotton, there is doubt about true output levels. The country's annual domestic demand for wheat is around two million tons (1.7 million for flour and 0.3 million for seed). With the official output levels (Table 8a) the country should have been exporting wheat by the middle of the first decade of the twenty-first century. President Niyazov was exhorting still higher production, with targets of four million tons in 2007 and five million tons in 2010. By October 2006 it became clear that official figures of a 3.1 million ton harvest were false by a large margin, and the President fired two of the country's five regional governors. In a TV broadcast President Niyazov stated that "in 2007 there won't be enough bread for everyone" and that "wheat-sowing amounted to less than fifty percent" of the target in each of the five provinces, before claiming that he had had difficulty sleeping since he heard the news.³⁵ In November the new governors were given two days to achieve the winter sowing targets, despite sub-zero temperatures in those days. Whatever the true harvests, output seems certain to have been below two million tons in recent years despite the

³⁴ Guadagni et al. (2005, p. 9) point out that in Uzbekistan wheat farming is also preferred because, unlike cotton, wheat is paid for on delivery and wheat only occupies irrigated land for part of the year, so that from July to November the land is free for other crops such as vegetables.

³⁵ Eurasia Insight "Bread Shortage grips Turkmenistan", posted at www.eurasianet.org on 5 December 2006.

threats and exhortations of the President. Moreover, relying on command with no input from agronomists has contributed to poor land use and declining seed stock quality.³⁶

The drive for self-sufficiency in food grains has negative consequences, apart from the poorer quality of wheat available for food.³⁷ In Uzbekistan incentives to increase the acreage under wheat have led to substantial decline in the area planted with fodder crops, and lack of rotation has led to soil degradation. Increasing the area devoted to fodder crops, especially alfalfa, would replenish soils with badly needed nitrogen taken from it by wheat and cotton and absorb salts, as well as providing fodder for livestock (Thurman and Lundell undated). Similar consequences are also evident in Turkmenistan, and even in the Kyrgyz Republic and Kazakhstan where the shift from fodder to wheat has been market-driven.

Livestock

Livestock production has had different experiences to crop production in Central Asia, although there is still some of the bifurcation between the more reformist regimes in Kazakhstan and the Kyrgyz Republic and the more dirigiste polices in Uzbekistan and Turkmenistan. Where the experience of grain and livestock sectors interact in all Central Asian countries has been in the reduced share of land devoted to fodder crops, which reduces land fertility and also reduces the carrying capacity of sedentary livestock farming. In Turkmenistan, Uzbekistan and Tajikistan, the mandated drive to increase cotton exports and wheat self-sufficiency work against the production of fodder crops, but also in the more market-driven agricultural sectors of the Kyrgyz Republic and Kazakhstan fodder production has declined drastically.

³⁶ President Niyazov's frequent purges included farm managers as well as local and provincial officials, and the lost expertise was not replaced by newly trained experts. The tertiary education system was practically destroyed and foreign qualifications no longer recognized, as the president placed loyalty above competence throughout his country.

³⁷ The point is frequently made that consumers prefer the hard wheat grown in Kazakhstan, but it is hard to observe consumer preferences in the regulated grain markets of Uzbekistan and Turkmenistan. Wall and Lamers (2004, p. 17) quote the owner of a wheat mill in Khorezm (Uzbekistan) as saying "We process the wheat but the quality is not as good as Kazakhstan ... wheat from Kazakhstan is much better to eat and cheaper." In Turkmenistan the president has been unwilling to authorize use of foreign exchange, which is in tightly controlled accounts, for imports of wheat or flour, and, as the quality of domestically produced flour has deteriorated, the price of imported flour in Turkmenistan's bazaars – if it is available – has skyrocketed.

In Kazakhstan transition saw the decimation of stock on large farms, while the number of animals on household plots held more or less constant. The situation is analyzed in greater detail in Pomfret (2008a), but in general terms large farms saw livestock as a liquid asset, which could be used to overcome their cashflow problems during the early and mid-1990s. Households kept one or two cows and a few sheep on their household plot as a hedge against the risks of the market economy. Public policy directed specifically towards livestock farming was minimal until the early 2000s when the government offered subsidies to rebuild the quality of the herds.

Similar patterns of vanishing large-scale livestock farming and concentration of the sector on small farms and household plots can be observed in the Kyrgyz Republic and Tajikistan. Cattle and sheep have become relatively more important, and pigs and chickens less so, reflecting the underlying pasture resource base and more input-intensive basis for raising chickens or pigs. The composition of the sheep population has shifted from fleecy sheep to fat-tailed sheep reared for their meat rather than their wool and producing low quality hides and wool. The concentration of livestock in small farms and household plots has been accompanied by a loss of specialized skills, poor breeding practices, and declining productivity.

In all three countries land reform has been particularly difficult for semi-nomadic pastoralists, but even settled livestock farmers have experienced problems. Livestock production was especially important and especially hard hit by privatization in Kazakhstan.³⁸ The seasonal movement of stock across the country's abundant rangelands has been practically eliminated, as the new property rights do not accommodate such activities. In consequence, there is overgrazing of land near human settlements and underutilization of rangelands. In the Kyrgyz Republic over two-fifths of the nine million hectares of pastureland (Table 2) is summer pasture, and over half of the remainder is spring/autumn pasture; underutilization of mountain pastures and overgrazing of winter pastureland has led to large declines in yield. In Tajikistan traditional grazing patterns based on summer use of alpine pastures have ceased.³⁹ These institutional problems, and consequences like the

³⁸ Suleimenov and Oram (2000) ascribe this to the more severe winters requiring heated barns and the disruption of power supplies during the transition from central planning. Privatization was less catastrophic in the Kyrgyz Republic where the farms were smaller and more flexible.

³⁹ In Tajikistan, even more than elsewhere, the traditional transhumant system was largely replaced during the Soviet era by a collectivised livestock sector which was sustained by large imports of grain. With the cessation of those imports the livestock numbers became unsustainable, and even after a post-1991 decline (Table 8b) the numbers are still above the carrying capacity. This is reflected in undernourished animals and low productivity; symptoms include milk yields as low as half a kilogram a day, calving intervals of 17-18 months, beef cattle

declining quality of the herds, are amenable to good policies, but they are not generally a consequence of policy distortions against livestock farming.

The Kyrgyz Republic is the only net exporter of livestock products in Central Asia, although most of this trade is unregistered. This has been driven by substantial increases in farmgate prices since the turn of the century. In the Soviet era, exports were based on frozen carcasses and tinned meat and wool, but this has been replaced by trade in live animals and, to a lesser extent, dairy products. In 2003 meat prices increased by 23 percent, driven in part by demand from Kazakhstan for live animals.⁴⁰ Before 1991 wool exports were supported by highly subsidized production of irrigated fodder and feeds, which was unsustainable after the collapse of central planning; wool exports declined from \$24 million in 1995 (the first reliable post-1992 data) to less than \$2 million in 2001 (Stryker and Livinets 2002, p. 4). A revival of wool exports since 2003 reflected trends in world prices, but also the increased activity of Chinese buyers in the Kyrgyz market. The dairy industry has seen the revival of exports to Kazakhstan, which were disrupted by prohibitive temporary tariffs in 1998-9. In recent years there have been rapid changes in marketing channels for these products, which have reduced transactions costs and reduced price dispersion across the country, although in some markets primary producers may be in a weak bargaining position, evidenced by their willingness to take discounted cash offers when they need money.

In Uzbekistan and Turkmenistan livestock numbers have increased since independence (Table 8b), reflecting the greater resilience of the large scale production units from the Soviet era. Climate may also have eased the transition in the southern Central Asian countries. Kerven (2003, p. 14) points out that sheep and camels in the Karakum Desert can graze year-round, although lack of investment has been associated with declining quality of wool and pelts. Even in the more common sedentary livestock farming, warmer climates meant less dependence on heated barns or on imported fodder which eased adaptation to the economic shocks of the 1990s.

Transfers from agriculture in Uzbekistan and Turkmenistan

four years old and lambs eighteen months old before slaughter (and still with low carcass weights), and the disappearance of the wool industry.

⁴⁰ This was partly policy-driven insofar as it coincided with increased subsidies to farmers in Kazakhstan for the purchase of new breeding stock.

Government regulation of agriculture in Uzbekistan and Turkmenistan distorted prices in order to transfer resources from the agricultural sector to the government. This has been especially true of cotton, where enforcement of a state marketing monopoly enables the government to pay farmers a price which is less than the price received for cotton exports. Several studies have estimated the size of the transfers, using models similar to that underlying Figure 2. These estimates are reported in Table 9.

Using 1992 data, Connolly and Vatnick (1994, pp. 205-8) estimate that the gross transfer from Uzbekistan's cotton farmers was \$1,034 million, but farmers received \$667 million in input subsidies, so that the net tax on farmers from the state order system cum subsidies amounted to \$367 million.⁴¹ Of this transfer, \$117 million went to domestic mills (area P_wbcP_d in Figure 2), of which the deadweight loss (abc) was \$31 million. These are large numbers for a country of 21 million people, in a period when senior government officials earned \$25 a month. The World Bank (1993) estimates that the cotton sector provided a sixth of government revenue in 1993. The transfer was even larger in 1994 and the first half of 1995 when world cotton prices increased faster than domestic prices in dollar terms, although the transfers declined when world prices fell sharply after July 1995 (Figure 1).

The transfers from Uzbekistan's cotton farmers to the state increased in the second half of 1996, reflecting their sensitivity to exchange rate changes.⁴² In August 1996 a producer price for raw cotton of 12,500 sum/ton was announced, equivalent to about 39,000 sum/ton of cotton fibre, which was 63 percent of the world market price of \$1600/ton.⁴³ By the end of 1996, depreciation of the sum had reduced the producer price to 44 percent of the world price IMF (1997, p. 13); and the proportion would be even smaller if the unofficial exchange rate, whose premium had diverged further from the official rate during the period, were used (e.g., with the end-1996 rate of about 100sum/\$ the farmers received \$400/ton of

⁴¹ The model used by Connolly and Vatnick is more complex than Figure 2 because they assume a market-related price on above-quota sales which is below the world price due to a (later-repealed) 5 percent export tax on cotton, but the consequences for their estimated effects are small.

⁴² Christoph Rosenberg, former IMF Resident Representative in Uzbekistan, has emphasised the implicit taxation arising from the multiple exchange rate system (Rosenberg, Ruocco and Wiegard 1999, Rosenberg and de Zeeuw 2001).

⁴³ Note that in different sources cotton prices may be quoted for seed cotton or for fibre equivalent, which is approximately three times higher per ton. Also it is not always clear how processing and transport margins, approximately \$220 per ton of fibre equivalent in the competitive US market (Lerman and Brooks 2001, p. 9), are treated.

fibre). With a continuing increase in the black market premium on dollars in 1997 and 1998, the farmers' share of the world price continued to decline.

Estimates for Turkmenistan and Uzbekistan of the transfers out of agriculture in the late 1990s concern the entire farm sector, or at least the two major crops (cotton and wheat), due to the difficulty of allocating the large input subsidies. The pattern is one of the very large transfers in both countries, but larger in Turkmenistan (Table 9).

The most thorough publicly available accounting of the resource transfers in Turkmenistan draws on an autumn 1998 farm survey supported by the World Bank. The sampled farms reported spending 42,804 million manat on purchased inputs (fertilizers, chemicals, fuel, transport and machinery services, etc) for which they receive a fifty percent subsidy. Given a total area sown by the sampled farms of 86,919 hectares, the subsidy was worth 246,250 manat per hectare. Extrapolating to the total area planted in cotton (548,000 ha.) and wheat (705,000 ha.) yields an estimated subsidy of about 300 billion manat. The 1998 output of cotton (700,000 tons) and wheat (1,200,000 tons) were respectively valued at 760 and 588 billion manat at procurement prices, and some 3,388 billion manat at international prices at the official exchange rate, implying an indirect tax of around 2,100 billion manat. Finally, farmers received an irrigation subsidy of 235 billion manat, according to the corresponding budget expenditure category. The net transfer out of agriculture amounted to 1,565 billion manat (i.e., 2100 – 300 – 235) or eleven percent of GDP (Lerman and Brooks 2001, pp. 10-11).

These estimates understate the tax on Turkmenistan's farmers because the calculations are at the official exchange rate. Adjusting Lerman and Brooks' net resource transfer estimates for the overvaluation of the official exchange rate is sensitive to whether one uses the late-1998 parallel rate of around 8,000 or the March 1999 rate of 17,000; the former implies a net resource transfer of 3,389 billion manat, equal to almost a quarter of GDP, and the latter implies a net resource transfer of 7,330 billion manat, equal to over half of GDP.⁴⁴ Pastor and van Rooden (2000, p. 12), using an exchange rate of 9,000 (a proxy for what the equilibrium rate might have been if controls were removed) estimate the transfers from wheat and cotton farmers in 1999 to have been 2,880 billion manat, or fifteen percent of GDP.⁴⁵ Perhaps the most that can be said is that the net resource transfers out of agriculture

⁴⁴ However, it did not really matter to the farmer whether he was paid in December 1998 or March 1999 because he was unlikely to spend much of his revenue on imports.

⁴⁵ The comparison with GDP is overstated because the export component of GDP is valued at the official exchange rate; for consistency exports should be valued at opportunity cost prices, rather than administered

in the 1998 crop season were substantially greater than 1,565 billion manat and probably double that amount due to the foreign exchange regime.

Estimates of the overall impact of transfers in and out of agriculture in Uzbekistan during the second half of the 1990s are also fairly impressionistic (Table 9), and are highly sensitive to the choice of exchange rate.⁴⁶ Khan (1996, p. 71) estimated, on the basis of information obtained during a 1995 ILO mission, that transfers out of agriculture amounted to a tenth of the GDP produced in agriculture. Herman (1999) using 1996 data calculated gross transfers from cotton farmers of \$1,402 million and from grain farmers of \$529 million, offset by \$198 million in irrigation water subsidies and \$200 million in other subsidies, to give a net transfer out of agriculture of \$1,533 million or 8 percent of GDP.⁴⁷ Rosenberg and de Zeeuw (2001), focusing on the impact of forex controls, estimate that the implicit tax on cotton increased from 3.4 percent of GDP in 1997 to 6.7 percent of GDP in 1999.

In the 2000s, cotton producers in Turkmenistan and Uzbekistan continued to be heavily taxed via the operations of state marketing monopolies, and this is only partially offset by subsidies. Quantification is difficult for Turkmenistan due to lack of data, but all anecdotal accounts tell of deteriorating rural conditions. In Uzbekistan there have been potentially significant reforms since 2000, when the government began to close the gap between official and black market rates for foreign exchange; the exchange rates were formally unified in October 2003, although a small black-market premium remains. Steps have also been taken to transform collective farms into individual farms and restructure the cotton ginning and foreign trade sectors, although the actual outcomes remain opaque.⁴⁸ The share of cotton covered by state procurement was reduced from 70 percent to 50 percent in

prices. Nevertheless, the valuation at the official exchange rate, when there was a large black market premium, ignores an added burden on farmers when imported consumption goods tend to have market-determined prices. It also represented an added gain to the government, as the domestic purchasing power of the dollars earned by exports increased while its obligations to the farmers, denominated in manat, remained unchanged.

⁴⁶ All of these estimates are subject to data difficulties, but one key assumption is that payments are made promptly and are accessible. The common delays in payments to farmers, reported payments in kind (cottonseed oil and flour) in some districts, and most of all the use of limited-access bank accounts may be the most important source of bias, which means that the reported calculations will underestimate the tax on farmers.

⁴⁷ These seem more plausible than the “approximate accounting of transfers” by the International Monetary Fund (IMF 1997, p. 65) showing transfers out of agriculture in 1996 of 25.4-28.4 billion sum (about 15 percent of the total value of agricultural production) being more than offset by transfers into the agricultural sector of 29.5 billion sum, of which 23.0 billion is due to subsidised irrigation. The IMF’s unexplained calculations appear to understate the costs to farmers from the state order system by using the official exchange rate to convert world prices into domestic prices and overstate the value of input subsidies.

⁴⁸ After the ginning sector was restructured in 2001, it comprised 134 gins of which 128 are joint stock companies controlled by the state and six are private. Output must be sold to the three Foreign Trade Agencies which handle export sales, apart from sales by the one or two private gins which have been granted export licences.

2002, and more importantly assessment has been based on actual rather than planned output.⁴⁹

Bravo and Crole-Rees (2005) estimate the distortions to the cotton sector in Uzbekistan in the period 2000-4. The net transfers decline dramatically between 2000 and 2001 due to a fall in “other implicit taxes”, which is primarily the effect of the dual exchange rate regime. After 2001 this component of implicit taxes practically disappears, and at the same time subsidies also decline sharply, from 7-8 percent of GDP in 2000 and 2001 to 2-3 percent of GDP in 2002-4. The consequence of these changes is that both negative and positive distortions are much lower from 2002 onwards. However, the net transfers from cotton producers steadily increase from 2.1 percent of GDP in 2001 to 5.4 percent of GDP in 2004 (Table 10). The price gap alone (even allowing for black market premia) does not capture the increasingly negative net distortion, which in 2002 is driven by a large decrease in subsidies and after that it is due to a mixture of changes in the price gap, explicit taxes and subsidies.⁵⁰

The dramatic decline in subsidies between 2001 and 2002 reported by Bravo and Crole-Rees (2005) is due to changes in composition. In 2001 and 2002 debt write-offs and credit subsidies account for over 70 percent of the total, but this share drops to 18 percent in 2002 and zero in 2003 and 2004.⁵¹ Meanwhile, input subsidies increased both absolutely and as a share of total subsidies, with irrigation and electricity subsidies alone accounting for over 80 percent of total subsidies in 2002-4. There are administrative costs of the centralized system, although Bravo and Crole-Rees report estimates that these amount to less than one percent of the value of gross agricultural output. Some implicit taxes and subsidies are omitted from their estimates. For example, farmers pay implicit taxes due to loss of soil fertility resulting from mandatory cropping patterns and due to low ginning efficiency or

⁴⁹ Previously, the share of the crop to pass through the state procurement system was based on planned output with the crucial condition that if the plan was under-fulfilled, as was often the case (from 1994 to 1999 the target production level remained at 4 million tons, and then fell gradually to 3.75 million tons in 2003, all far above the actual output levels in Table 8a), 100 percent of output must go through the state marketing system.

⁵⁰ Bravo and Crole-Rees, and Guadagni et al. (2005), mention the lack of transparency surrounding the principal explicit taxes: land tax, VAT, and remittance to the Pension Fund. These costs are automatically levied from cotton producers’ bank accounts and allow some bureaucratic discretion in assessing the value-added to be taxed or the combination of family and external permanent or seasonal labor for which Pension Fund deductions are due. In principle, VAT should be refunded on exports but in practice it is rarely refunded to cotton producers (see Note to Table 10).

⁵¹ To some extent the directed lending to cotton producers was a tax on banks’ depositors, including farmers.

incompetence of the three Foreign Trade Agencies which handle virtually all cotton exports and may fail to obtain the best price.⁵²

Guadagni et al. (2005) report a similar pattern of both taxes and subsidies declining, but with smaller magnitudes; they estimate that net taxes on cotton farming in Uzbekistan declined from about 8 percent of GDP in 2000-1 to 1.8 percent in 2004. Net transfers from cotton farmers declined from 50 percent of farmers' gross cotton revenue in 2000, to 20-22 percent in 2003-4. In 2004 total taxes on cotton farmers in Uzbekistan, both direct and indirect via the price gap on State Trading Organization purchases, amounted to \$644 million, compared to \$441 million in subsidies (Table 11). Their estimated subsidies in 2004 are, however, substantially different from those reported by Bravo and Crole-Rees (2005); interest rate credits (\$81 million) and debt write-offs (\$136 million) accounted for half, and irrigation subsidies (\$161 million) accounted for most of the rest. Thus, the main support in 2004 was that interest rates on loans to the farm sector are charged at 5 percent, which is below market rates. A minor benefit (worth \$28 million) is that producers can buy 50 percent of cotton oil and other by-products at a preferential price. The fuel, machinery and fertilizer subsidies largely consist of VAT waivers. Guadagni et al. (2005, 3) also estimate the implicit taxes due to low ginning efficiency. If Uzbekistan's gins, run by a state-owned monopoly, were to achieve a 38 percent efficiency rather than the official 32.7 percent, then final cotton fibre output for a given harvest would increase by 16 percent, which at current output levels and prices amounts to almost \$200 million.⁵³

A December 2004 Agricultural Sector Review and Planning report prepared for the Asian Development Bank and the Uzbekistan Ministry of Economy estimated that indirect taxes through cotton and wheat pricing amounted to about 10 percent of GDP.

⁵² Bravo and Crole-Rees (2005, p. 13) report a World Bank study that estimates the cost of declining soil fertility due to cotton-growing to be \$5 million. They also cite FAO findings of much higher levels of profitability for vegetables, melons, grapes and especially potatoes on land currently devoted to cotton or wheat.

⁵³ Guadagni et al. (2005) state that 38 percent is typical of similar cotton-producing countries. Goreux (2003, p. 49) reports ginning ratios between 40 percent and 43 percent in five West African countries in the early 2000s. In Xinjiang with similar quality of cotton to Central Asia the average outturn is 39 percent (report of World Bank mission, 21-29 September 2004). A source of inefficiency in Uzbekistan is underutilization of gins as the government keeps all 134 gins operating despite falling harvests and smuggling of cotton for ginning in Kazakhstan or the Kyrgyz Republic. Bravo and Crole-Rees (2005, p. 20) provide anecdotal evidence of actual outturns closer to 34 percent than to the official 32.7 percent, with the benefit accruing to the gins. Yuldashev (2005) sees underreporting of ginning ratios as an example of corruption to benefit the elite (by up to \$140 million a year); he also claims that the quality of much cotton is reassessed upon delivery, e.g. in 2004 most cotton was reportedly first grade for which farmers were paid \$235 per ton but in fact it was assessed as fourth or fifth grade with a price of \$60-70 and the aggregate price difference of around \$200 million was hidden from official records and accrued to the cotton barons.

Price distortions

Deriving nominal rates of assistance (NRAs) with the standard Anderson et al. (2006) methodology is difficult for cotton because of the nature of the processing and marketing and because of the variability of the world price. Even in the market-based cotton sectors of Kazakhstan and the Kyrgyz Republic, purchasers of raw cotton may misjudge the appropriate offer-price given that the world market price may have moved substantially by the time that the cotton has been ginned, baled and shipped. In the regulated systems of Turkmenistan and Uzbekistan farmgate prices tend to change slowly from year to year, so that calculated NRAs are driven by the volatile reference prices; there is little change in the farmers' situation, and the fluctuating price gap indicates the volatility of state revenues rather than capturing distorted incentives to producers.

Comparing the price gap between border and domestic prices for cotton requires several steps, some of which involve assumptions with a major impact on the estimated distortion. The most frequently cited 'world price' for cotton is the Cotlook A index (Figure 1). To convert this to an fob export price, transport and handling costs to a port, which may be Riga or a Black Sea port, or another transport route, must be included. The price should also be adjusted for quality differences, which is especially important for Tajikistan but difficult to document. Conversion of the border price into domestic currency units can be at the market exchange rate for Kazakhstan or the Kyrgyz Republic but when forex controls exist (in Turkmenistan or Uzbekistan) the choice of appropriate exchange rate is more difficult. In Tajikistan adjustment needs to be made for export taxes.

Internal transport, handling and commissions include costs of moving the cotton from the farm to the border, but some costs are difficult to interpret if they are economy-wide rather than sector-specific distortions (such as red tape and unofficial levies en route). Similarly, ginning costs must be deducted from the border price to construct a reasonable reference price for the farmer, but allowance for ginning costs may be distorted by the inefficiency of that sector. The ginning outturn ratio determines the conversion of the baled cotton price into the equivalent reference price for raw cotton, which is the relevant point of comparison to farmgate prices; but reported outturns in Central Asia since 1992 have been exceptionally variable (from 22 percent

to 47 percent in Table 4), which reflects large variations in efficiency within the sector and is also due to smuggling-related problems described above.

In the country chapters on Kazakhstan and the Kyrgyz Republic (Pomfret 2008a, 2008b), estimated distortions for cotton are among the most volatile. For Kazakhstan the nominal rate of assistance as a percentage of farmgate revenue in the years from 2000 to 2004 was 31, -13, 37, 39 and -23 percent. This was a period of little observed change in the policy environment and, although the shift to a negative distortion for 2004 may be explained by cartelization of the ginning sector, that explanation seems inadequate to explain the magnitude of the reversal from positive to negative assistance. In the Kyrgyz Republic chapter a longer series is presented, from 1995 to 2005, but with similar volatility (1, 5, -39, 9, -70, -28, 35, -6, -2 and 42 percent), whose magnitude is not explicable in terms of policy-driven distortions to farmers' incentives.

Estimating distortions for the regulated economies of Turkmenistan and Uzbekistan, or for the poorly integrated Tajik economy, is more difficult. The calculations are illustrated in Table 12 by the estimated price gap for Uzbekistan in 2002, from Christensen (2003). Depending on whether one considers the official price or the marginal price and the official exchange rate or the commercial rate, the domestic price at the distribution center was between 46 percent and 2 percent below the reference price. The farmgate price was lower, but Christensen's figures still imply distortions that are less negative than suggested by other well-informed observers. Baffes (2004) estimates that cotton farmers in Uzbekistan receive about a third of the value of their crop, while ICG (2005) places the share at 10-15 percent. To the best of my knowledge, there are no comparable estimates for Turkmenistan since the late 1990s, although all anecdotal evidence is of large negative price gaps.

As an indicative guide to the degree of distortion in the Central Asian economies' cotton sectors, Table 13 compares the pattern of a standard reference price (based on the Cotlook A Index) to that of domestic prices as reported by the FAO.⁵⁴ Given the reservations expressed above and in Section 2, this is clearly a very rough approximation. Table 13 implies that the Kazakhstan and Kyrgyz producer price series have more or less tracked world price movements since the mid-1990s, but the ratio of Kazakh prices to the reference price improved relative to the situation in the Kyrgyz Republic. The overall picture is consistent with a story of minor distortions in the Kyrgyz Republic since the price

⁵⁴ The reference price makes a fixed \$200 allowance for transport, handling and other costs and assumes a ginning outturn of one third. In fact, the margin may have a fixed cost component dependent on the harvest size and may also be related to the value per ton. Most of the detailed calculations, such as those of Christensen

liberalization and establishment of monetary stability in 1993-5, and of a somewhat later reduction in distortions in Kazakhstan. This, is consistent with the switch from higher domestic prices in the Kyrgyz Republic (\$394) than in Kazakhstan (\$349) in 1997 (Goletti and Chabot 2000) to higher domestic prices in Kazakhstan (\$550) than in the Kyrgyz Republic (\$450) in 2003 (Sadler 2006).⁵⁵

At first sight the levels of prices in Tajikistan in Table 13 seem the most credible, but given the concerns about the other five countries' data this may be coincidental. The Tajik data do, however, follow a time path consistent with the analysis in Section 2 of prices being slightly below the reference price in the late 1990s, and then a substantial widening of the negative price gap in the 2000s.

The FAO price data for Turkmenistan and Uzbekistan are worthless – they are implausibly high for the former and implausibly low for the latter.⁵⁶ For both countries the negative distortion became increasingly large in the late 1990s, with precise magnitudes depending upon which exchange rate is used. Despite the paucity of reliable data in the final years of Turkmenbashi's reign, all indicators are that, despite a fast-growing GDP driven by high prices for natural gas exports, rural living standards fell and the negative distortions faced by farmers increased. The situation of Uzbekistan's farmers was also poor in the late 1990s, although their situation may have improved somewhat in 2003-5 as the price gap narrowed, although subsidies declined.

My guess is that the nominal rates of assistance to cotton growing have been negative in all five Central Asian countries since 1992. The sector enjoyed positive support in the Soviet era, but with price liberalization the price of inputs increased by far more than the price of outputs. Since the late 1990s distortions to cotton sector incentives have been small in Kazakhstan and the Kyrgyz Republic, although year-to-year calculations of NRAs are volatile due to the purchasers from farmers failing to predict world prices accurately. A similar picture was probably true for Tajikistan from the end of the civil war in 1997 until the

(2003) in Table 12, assume a mixture of fixed and variable costs, but the degree of error is unlikely to be large, especially relative to the errors in the domestic price data.

⁵⁵ Although the two studies used as benchmarks are the most careful cross-country comparisons available, the numbers are not mutually consistent because they incorporate differing approaches to constructing domestic prices. Thus, prices quoted in Sadler (2006) for the market-oriented cotton sectors in 2003 are substantially higher than the 1997 estimates of Goletti and Chabot (2000), even though world prices were 20 percent lower in 2003 than in 1997.

⁵⁶ The FAO data for the early 1990s, not reported in Table 13, are also difficult to reconcile with the facts insofar as they indicate very large differences in local currency prices even though all five countries were using the same currency in 1990-2 and there were virtually no border restrictions.

turn of the century, but the situation facing cotton farmers has become increasingly negative since 2000.

Farmers in Turkmenistan and Uzbekistan face far larger negative distortions to their incentives, probably somewhere greater than -50 percent. Since the early 2000s the negative distortions may have been moderated in Uzbekistan, and they are slightly less negative for wheat farmers.

Conclusions

During the transition from central planning in the 1990s, a clear division emerged in Central Asia between the roughly neutral policy towards agriculture in Kazakhstan and the Kyrgyz Republic on the one hand, and on the other the situation in Turkmenistan and Uzbekistan whose governments relied increasingly on rent extraction from agriculture for a large share of their revenues. Farmers in Tajikistan experienced the chaos and disruption that destroyed the national economy, but appear not to have faced substantial sector-specific distortions.

In Turkmenistan and Uzbekistan, by contrast to the Kyrgyz Republic and Kazakhstan, governments used state monopoly power over marketing to transfer substantial resources out of agriculture. The distortions and transfers became significantly higher in Turkmenistan than in Uzbekistan in the late 1990s (Table 9), and the gap between the two countries has widened since 2000 as exchange rate distortions in Turkmenistan have increased while those in Uzbekistan were reduced. Most of the agricultural transfers in Uzbekistan appear to go to general government revenue, whereas in Turkmenistan much has been wasted (e.g., in inefficient cotton mills with negative value-added) or accrued to secret accounts under the President's personal control. The Uzbekistan government is more aware of the costs of taxing the cotton sector and, although it remains dependent on cotton for revenues, it has introduced reforms aimed at reducing the negative incentives to producers and increasing their supply responsiveness.

The situation in Tajikistan is opaque. The government does rely on rents from the cotton grown in southwest Tajikistan for a significant part of its revenue, and the reality, at least for cotton producers (and perhaps for wheat), may be closer to the Uzbekistan pattern

than implied by this account (or Table 6, based on a year before the regime had cemented its power).

The dirigisme in Turkmenistan, Uzbekistan and Tajikistan has been facilitated by the dominance of cotton in their farm sectors, and the relative ease with which rents can be extracted from this crop. Government control has also been strong in the grain sectors, as governments have promoted wheat production in the name of increasing food self-sufficiency. By all accounts, grain farmers in all three countries face negative rates of assistance, but the distortion is less extreme than for cotton. Other sectors, notably livestock farming, have been relatively less harmed by the transition, but the lack of flexibility in the output mix is in striking contrast to that in the Kyrgyz Republic.

References

- ADB (2002), *Cotton in Central Asia: A Review of Policy and Technology*, Manila: Asian Development Bank.
- ADB (2004), *Farm Debt Resolution and Policy Reforms*, TA4052 TAJ, Final Report, Asian Development Bank, Manila, June.
- Akimov, A. (2007), *Financial Development and Economic Growth: Theory, Evidence and Implications for Uzbekistan*, unpublished PhD thesis, University of New England, Armidale, Australia.
- Anderson, K., W. Martin, D. Sandri and E. Valenzuela (2006), 'Methodology for Measuring Distortions to Agricultural Incentives', Agricultural Distortions Working Paper 02, World Bank, Washington DC, December. Posted at www.worldbank.org/agdistortions
- Anderson, K. and E. Valenzuela (2007), 'The World Trade Organization's Doha Cotton Initiative: A Tale of Two Issues', *The World Economy* 30(8): 1281-1304, August.
- Anderson, K., E. Valenzuela and L.A. Jackson (2008), 'Recent and Prospective Adoption of Genetically Modified Cotton: a Global Computable General Equilibrium Analysis of Economic Impacts', *Economic Development and Cultural Change* 55(2), January (forthcoming).
- Baffes, J. (2004), 'Cotton: Market Setting, Trade Policies and Issues', Policy Research Working Paper 3218, World Bank, Washington DC.

- Baffes, J. (2008), 'Distortions to Cotton Sector Incentives in West and Central Africa', in *Distortions to Agricultural Incentives in Africa*, Washington DC: World Bank.
- Bravo, H. and A. Croel-Rees (2005), 'The Cotton Sector and Taxation in Uzbekistan: Which Way Ahead?', mimeo, Lausanne.
- Cannell, E. (2005), 'The Role of Children in Uzbekistan's Cotton Harvest', paper presented at the conference on the Cotton Sector in Central Asia: Economic Policy and Development Challenges, held at the School of Oriental and African Studies, University of London 3-4 November. Summary available at: www.soas.ac.uk/cccacfiles/cottonsector/powerpoint/ElliottCannell.ppt
- Christensen, G. (2003), 'Deregulating Farm Management and State Marketing of Wheat and Cotton in Uzbekistan', mimeo, World Bank, Washington DC.
- Connolly, M. and S. Vatnick (1994), 'Uzbekistan: Trade Reform in a Cotton Based Economy', pp. 199-210 in C. Michalopoulos and D. Tarr (eds.), *Trade in the New Independent States*, Washington DC: World Bank.
- Devereux, C., R. Lawrence and M. Watkins (2006), 'Brazil's WTO Cotton Case: Negotiation through Litigation', pp. 235-82 in C. Devereux, R. Lawrence and M. Watkins (eds.), *Case Studies in US Trade Negotiations. Volume 2: Resolving Disputes*, Washington DC: Institute for International Economics.
- Goletti, F. and P. Chabot (2000), 'Food Policy Research for Improving the Reform of Agricultural Input and Output Markets in Central Asia', pp. 45-69 in S. Babu and A. Tashmatov (eds.), *Food Policy Reforms in Central Asia* Washington DC: International Food Policy Research Institute. (Also in *Food Policy* 25(6): 661-79, December 2000).
- Goreux, L. (2003), 'Reforming the Cotton Sector in Sub-Saharan Africa (Second Edition)', Africa Region Working Paper Series No.62, World Bank, Washington DC.
- Guadagni, M., M. Raiser, A. Crole-Rees and D. Khidirov (2005), 'Cotton Taxation in Uzbekistan: Opportunities for Reform', ECSSD Working Paper No.41, Environmentally and Socially Sustainable Development, Europe and Central Asia Region, World Bank, Washington DC.
- Guchgeldiev, O. (1999), *Comprehensive Economic Study of Cotton Production Sub-Sector in Turkmenistan*, unpublished dissertation for Masters in Public Economic Management, University of Birmingham, England.
- Herman (1999),

- ICG (2003), 'Uzbekistan's Reform Program: Illusion or Reality?', ICG Asia Report No.46 : Osh and Brussels: International Crisis Group.
- ICG (2005), 'The Curse of Cotton: Central Asia's Destructive Monoculture', ICG Asia Report No.93, Bishkek and Brussels: International Crisis Group.
- IMF (1997), *Republic of Uzbekistan - Recent Economic Developments*, IMF Staff Country Report No. 97/98, International Monetary Fund, Washington DC, October.
- Kerven, C. (ed.) (2003), *Prospects for Pastoralism in Kazakstan and Turkmenistan*, London: Routledge.
- Khan, A.R. (1996), 'The Transition to a Market Economy in Agriculture', pp. 65-92 in K. Griffin (ed.), *Social Policy and Economic Transformation in Uzbekistan*, Geneva: International Labour Organization.
- Lerman, Z., and K. Brooks (1998), 'Land Reform in Turkmenistan', pp. 162-85 in S.K. Wegren (ed.), *Land Reform in the Former Soviet Union and Eastern Europe*, London: Routledge.
- Lerman, Z., and K. Brooks (2001), 'Turkmenistan: An Assessment of Leasehold-Based Farm Restructuring', World Bank Technical Paper No.500, ECA Environmentally and Socially Sustainable Development Series, World Bank, Washington DC.
- Lewis, R. (ed.) (1992), *Geographic Perspectives on Soviet Central Asia*, London: Routledge.
- Melyuhina, O. (2003), 'Policy and Non-Policy Sources of Agricultural Price Distortions: Evidence from the Measurement of Support in Selected Transition Economies', pp. 119-39, *Agricultural Trade and Poverty: Making Policy Analysis Count*, Paris: Organisation for Economic Cooperation and Development.
- Pastor, G., and R. van Rooden (2000), 'Turkmenistan - The Burden of Current Agricultural Policies', IMF Working Paper WP/00/98, International Monetary Fund, Washington DC.
- Pomfret, R. (1995), *The Economies of Central Asia*. Princeton NJ: Princeton University Press.
- Pomfret, R. (2000), 'Agrarian Reform in Uzbekistan: Why has the Chinese Model Failed to Deliver?' *Economic Development and Cultural Change* 48(2): 269-84.
- Pomfret, R. (2001), 'Turkmenistan: From Communism to Nationalism by Gradual Economic Reform', *MOCT-MOST (Economic Policy in Transitional Economies)*: 11(2): 155-66.
- Pomfret, R. (2002), 'State-Directed Diffusion of Technology: The Mechanization of Cotton-Harvesting in Soviet Central Asia', *Journal of Economic History* 62(1): 170-88.

- Pomfret, R. (2006), *The Central Asian Economies Since Independence*, Princeton NJ: Princeton University Press.
- Pomfret, R. (2008a), 'Kazakhstan', Ch. 5 in K. Anderson and J. Swinnen (eds.), *Distortions to Agricultural Incentives in Eastern Europe and Central Asia*, Washington DC: World Bank.
- Pomfret, R. (2008b), 'Kyrgyz Republic', Ch. 5 in K. Anderson and J. Swinnen (eds.), *Distortions to Agricultural Incentives in Eastern Europe and Central Asia*, Washington DC: World Bank.
- Rosenberg, C. and M. de Zeeuw (2001), 'Welfare Effects of Uzbekistan's Foreign Exchange Regime', *IMF Staff Papers* 48(1): 160-78.
- Rosenberg, C., A. Ruocco and W. Wiegard (1999), 'Explicit and Implicit Taxation in Uzbekistan', pp. 141-62 in I. Nübler and H. Trabold (eds.), *Herausforderungen an die Wirtschaftspolitik an der Schwelle zum 21. Jahrhundert, Festschrift für Lutz Hoffmann zum 65. Geburtstag*, Berlin: Duncker und Humboldt.
- Sadler, M. (2006), 'Vertical Coordination in the Cotton Supply Chains in Central Asia', pp. 73-114 in J. Swinnen (ed.), *The Dynamics of Vertical Coordination in Agrifood Chains in Eastern Europe and Central Asia*, ECSSD, Europe and Central Asia Region, Working Paper No.42, World Bank, Washington DC.
- Spoor, M. (2006), 'Agricultural Reform Policies in Uzbekistan', pp. 181-203 in S.C. Babu and S. Djalalov (eds.), *Policy Reforms and Agricultural Development in Central Asia*, New York: Springer.
- Stryker, D. and S. Livinets (2002), 'CIS7 Rural Poverty and Growth Study: Rural Marketing in the Kyrgyz Republic', paper prepared for the World Bank, Washington DC, October.
- Suleimenov, M. and P. Oram (2000), 'Trends in Feed, Livestock Production, and Rangelands During the Transition Period in Three Central Asian Countries', *Food Policy* 25(6): 681-700.
- Swinnen, J. and S. Rozelle (2006), *From Marx and Mao to the Market: The Economics and Politics of Agricultural Transition*, London: Oxford University Press.
- Swinnen, J., M. Sadler and A. Vandeplass (2006), 'Contracting, Competition and Rent Distribution in Supply Chains: Theory and Empirical Evidence in Central Asia', in J. Swinnen (ed.), *The Dynamics of Vertical Coordination in Agrifood Chains in Eastern*

- Europe and Central Asia*, ECSSD, Europe and Central Asia Region, Working Paper No.42, World Bank, Washington DC.
- Thurman, M. and M. Lundell (undated), 'Agriculture in Uzbekistan: Private, Dehqan, and Shirkat Farms in the Pilot Districts of the Rural Enterprise Support Project', mimeo, World Bank, Washington DC.
- Tukhbatullin, F. (2005), 'Turkmen Cotton: Treasure Turned into Burden', paper presented at the conference on the Cotton Sector in Central Asia: Economic Policy and Development Challenges, held at the School of Oriental and African Studies, University of London 3-4 November. Summary available at:
www.soas.ac.uk/cccacfiles/cottonsector/powerpoint/FaridTukhbatullin.ppt
- Valdés, A. (2000), 'Measures of Agricultural Support in Transition Economies: 1994-1997', in A. Valdés (ed.), *Agricultural Support Policies in Transition Economies*, World Bank Technical Paper No.470, Washington DC, pp. 1-25.
- Wall, C., and J. Lamers (2004), 'Farmer Priority Setting: Issues and Research Needs for Khorezm, Uzbekistan', *Central Asian Journal* 4: 5-25 (also circulated as ZEF *Working Paper for Sustainable Development in Central Asia No.3*, Bonn, 2004).
- World Bank (1993), *Uzbekistan: An Agenda for Economic Reform*, Washington DC: World Bank.
- World Bank (2002a), *National and Regional Water and Salt Management Plans*, Water and Environment Management Project Phase III Report, World Bank, Tashkent, November.
- World Bank (2002b), *Irrigation in Central Asia: Where to Rehabilitate and Why*, Washington DC: World Bank.
- Yuldashev, T. (2005), 'Uzbek Cotton: On the Crossroads of Vested Interests', paper presented at the conference on the Cotton Sector in Central Asia: Economic Policy and Development Challenges, held at the School of Oriental and African Studies, University of London 3-4 November. Summary available at:
www.soas.ac.uk/cccacfiles/cottonsector/powerpoint/TashpulatYuldashev.ppt

Table 1: Demographic and economic indicators, Central Asia, 2003

	Population	Rural population	Openness (percent of GDP)		GDP per capita (US dollars)	
	(millions)	(percent of total)	Exports	Imports	current	PPP
Kazakhstan	14.9	44.1	50	44	2,000	6,671
Kyrgyz Rep	5.1	66.0	38	42	378	1,751
Tajikistan	6.4	75.2	60	79	246	1,106
Turkmenistan	4.7	54.6	41	42	1,275	5,938
Uzbekistan	25.8	63.3	37	30	389	1,744

Source: UNDP *Human Development Report 2005*, accessed at <http://hdr.undp.org/statistics>

Table 2: Farmland resources, Central Asia, 1999

(thousand hectares)

	Total cultivated cropland	Irrigated cropland	Pasture
Kazakhstan	30,135	2,313 (7)	18,233
Kyrgyz Rep	1,435	1,077 (75)	9,216
Tajikistan	860	719 (84)	3,600
Turkmenistan	1,744	1,744 (100)	3,070
Uzbekistan	4,850	4,309 (89)	2,280

Source: World Bank (2002, vol.1, p. 4).

Note: Figures in parentheses are the percentage of the total cultivated cropland which is irrigated. In southern Kazakhstan 70 percent of the cropland is irrigated.

Table 3: Macroeconomic performance, Central Asia, 1989 to 2006

(a) Growth in real GDP 1989-2005 (per cent)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1999; 1989 =100
Kazakhstan	0	0	-13	-3	-9	-13	-8	1	2	-2	2	63
Kyrgyz Rep	8	3	-5	-19	-16	-20	-5	7	10	2	4	63
Tajikistan	-3	-2	-7	-29	-11	-19	-13	-4	2	5	4	44
Turkmenistan	-7	2	-5	-5	-10	-17	-7	-7	-11	5	16	64
Uzbekistan	4	2	-1	-11	-2	-4	-1	2	3	4	4	94

Source: European Bank for Reconstruction and Development, *Transition Report Update*, April 2001, p. 15.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2005; 1989=100
Kazakhstan	-2	3	10	14	10	9	10	9	9	113
Kyrgyz Rep	2	4	5	5	0	7	7	-1	4	84
Tajikistan	5	4	8	10	9	10	11	7	7	74
Turkmenistan	7	17	19	20	16	17	17	10	9	163
Uzbekistan	4	4	4	4	3	2	7	7	7	123

Source: European Bank for Reconstruction and Development, *Transition Report 2006*, p. 32.

Notes: 2005 = preliminary actual figures from official government sources. Data for 2006 represent EBRD projections.

(b) Inflation (change in consumer price index) 1991-2006 (per cent)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kazakhstan	79	1,381	1,662	1,892	176	39	17	8	7
Kyrgyz Rep	85	855	772	229	41	31	26	36	12
Tajikistan	112	1,157	2,195	350	609	418	88	28	43
Turkmenistan	103	493	3,102	1,748	1,005	992	84	24	17
Uzbekistan	82	645	534	1,568	305	54	59	29	18

Source: European Bank for Reconstruction and Development, *Transition Report Update*, April 2001, p. 16.

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Kazakhstan	7	8	13	8	6	6	7	8	9
Kyrgyz Rep	11	36	19	7	2	3	4	4	6
Tajikistan	43	28	33	39	12	16	7	7	9
Turkmenistan	17	24	8	12	11	7	6	11	9
Uzbekistan	29	29	25	27	28	10	9	21	19

Source: European Bank for Reconstruction and Development, *Transition Report 2006*, p. 32.

Notes: 2005 = preliminary actual figures from official government sources. Data for 2006 represent EBRD projections.

Table 4: Cotton area harvested and output, Central Asia, 1992 to 2003

Year	Kazakhstan				Kyrgyz Republic				Tajikistan				Uzbekistan			
	A	Q _s	Q _b	G	A	Q _s	Q _b	G	A	Q _s	Q _b	G	A	Q _s	Q _b	G
1992	111	246	76	31	22	52	14	27	285	513	174	34	1,667	4,129	1,274	31
1993	110	198	60	30	20	49	13	27	275	524	180	34	1,695	4,235	1,321	31
1994	110	208	72	35	27	54	17	31	283	531	167	31	1,539	3,936	1,258	32
1995	107	223	69	31	33	75	18	24	270	411	130	32	1,493	3,934	1,265	32
1996	103	183	79	43	32	73	21	29	228	318	119	37	1,487	3,350	1,081	32
1997	102	198	67	34	25	62	25	40	219	353	110	31	1,513	3,639	1,080	30
1998	115	162	62	38	32	78	21	29	247	384	115	30	1,532	3,206	1,147	36
1999	141	249	67	27	35	87	25	29	248	313	98	31	1,517	3,600	1,021	28
2000	153	287	95	33	34	88	29	33	239	335	93	28	1,444	3,002	1,000	33
2001	184	418	113	27	38	98	34	35	257	453	145	32	1,452	3,275	1,015	31
2002	168	361	90	25	36	109	46	42	269	515	113	22	1,397	3,200	1,008	32
2003	182	480	120	25	38	108	51	47	284	533	117	22	1,393	2,856	914	32

Source: Sadler (2006), citing FAO data.

Notes: A = area harvested in thousand hectares, Q_s = production of seed cotton in thousand tonnes, Q_b = production of baled cotton in thousand tonnes, G = ginning outturn (ie. Q_b/Q_s) in percent

Table 5: Cotton output, Central Asia, 2004/5 season

(thousand tonnes)

	Production	Exports
Kazakhstan	142	114
Kyrgyz Rep	48	44
Tajikistan	174	131
Turkmenistan	207	87
Uzbekistan	1,089	740
World Total	25,412	7,247

Source: United States Department of Agriculture, Foreign Agricultural Service at <http://www.fas.usda.gov/cotton/circular/2005/02/table05a.pdf>

Table 6: Output price for cotton, 1997 and 2003 harvest seasons

	Kazakhstan	Kyrgyz Rep.	Tajikista n	Turkmenistan	Uzbekista n
1997 in local currency	25,500 tenge	7,100 som	190,000 TR	1,000,000 manat	14,750 sum
1997 in US dollars	\$349	\$394	\$388	\$240 (\$188) ^a	\$242 (\$105) ^a
2003 in US dollars	\$550	\$450	\$165	na	\$200

Sources: 1997 - Goletti and Chabot (2000, p. 55); 2003 - Swinnen, Sadler and Vandeplas (2006, Table 6.2).

Notes: ^a = at parallel exchange rate; na = not available.

Table 7: Cost of plant nutrients, Central Asia, mid-1990s

(per kilogram, in US dollars)

	Kazakhsta n	Kyrgyz Rep	Tajikista n	Turkmenistan	Uzbekista n
Nitrogen	0.50	0.50	0.50	0.12	0.25
Phosphorous	1.50	1.50	1.00	1.00	0.50
Potassium	0.16	0.16	0.15	0.04	0.07

Source: Goletti and Chabot (2000, p. 60), citing data from an EU-Tacis 1995 report.

Table 8: Output of major crops and stocks of key animals, Central Asia, 1992 to 2005

(a) Cotton, wheat and rice production (kt)

year	Kazakhstan			Kyrgyz Rep			Tajikistan			Turkmenistan			Uzbekistan		
	C	W	R	C	W	R	C	W	R	C	W	R	C	W	R
1992	246	18,285	467	52	679	3	513	170	3	1,290	377	64	4,129	964	539
1993	198	11,585	403	49	831	2	524	159	2	1,341	509	88	4,235	876	545
1994	208	9,052	283	54	608	4	531	182	4	1,283	675	92	3,936	1,362	498
1995	223	6,490	184	75	625	7	412	174	7	1,293	695	79	3,934	2,347	328
1996	183	7,678	226	73	964	9	318	400	9	436	453	41	3,350	2,742	450
1997	198	8,955	255	62	1,277	12	353	452	12	635	707	27	3,639	3,073	389
1998	162	4,746	236	78	1,204	11	384	388	11	707	1,245	14	3,206	3,556	346
1999	249	11,242	199	87	1,109	15	313	356	15	1,300	1,506	33	3,600	3,602	421
2000	287	9,074	214	88	1,039	19	335	406	19	1,030	1,690	27	3,002	3,532	155
2001	418	12,707	198	98	1,191	17	453	387	17	1,100	1,760	39	3,265	3,690	68
2002	361	12,700	199	106	1,163	21	515	545	21	700	2,326	80	3,122	4,967	175
2003	403	11,537	273	106	1,014	18	537	660	18	714	2,487	110	2,823	5,437	334
2004	467	9,937	276	122	998	18	557	631	18	1,000	2,600	110	3,535	5,378	181
2005	350	11,300	310	122	1,200	20	600	780	20	1,000	2,900	120	3,770	5,840	100

Source: FAO at <http://faostat.fao.org/faostat/> (accessed 12 April 2006)

(b) Year-end stocks of cattle and sheep (thousand head)

year	Kazakhstan		Kyrgyz Rep		Tajikistan		Turkmenistan		Uzbekistan	
	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep
1992	9,084	33,908	1,190	9,225	1,391	2,484	777	5,380	5,113	8,275
1993	9,576	33,732	1,122	8,480	1,246	2,172	1,004	6,000	5,275	8,407
1994	9,347	33,312	1,062	7,103	1,250	2,078	1,104	6,000	5,431	9,360
1995	8,073	24,273	920	4,924	1,199	1,958	1,181	6,100	5,484	9,053
1996	6,860	18,786	869	4,075	1,147	1,805	1,199	6,150	5,204	8,352
1997	5,425	13,000	848	3,545	1,104	1,650	959	5,400	5,100	7,340
1998	4,307	9,693	885	3,425	1,050	1,554	1,100	6,000	5,200	7,706
1999	3,958	8,691	911	3,309	1,037	1,494	1,250	6,800	5,225	7,840
2000	3,998	8,725	932	3,264	1,037	1,472	1,400	7,500	5,268	8,000
2001	4,107	8,939	947	3,198	1,062	1,478	1,600	8,230	5,344	8,100
2002	4,294	9,208	970	3,104	1,091	1,490	1,750	10,350	5,478	8,311
2003	4,560	9,788	988	3,104	1,136	1,591	1,900	12,570	5,879	8,934
2004	4,871	10,420	1,003	2,884	1,219	1,672	2,000	13,150	6,243	9,514
2005	5,204	11,287	1,035	2,965	1,303	1,782	2,000	13,000	5,400	9,500

Source: FAO at <http://faostat.fao.org/faostat/> (accessed 12 April 2006)

Table 9: Estimated transfers out of agriculture, Turkmenistan and Uzbekistan, 1990s

	Year	Coverage	Value	Reference
Turkmenistan				
Lerman and Brooks (undated)	1998	Cotton and wheat	1,565 billion manat	11 percent of GDP
Pastor and van Rooden (2000)	1999	Cotton and wheat	2,880 billion manat	15 percent of GDP
Lerman and Brooks (undated), adjusted	1999	Cotton and wheat	7,330 billion manat	
Uzbekistan				
Connolly and Vatnick (1994)	1992	Cotton	\$367 million	
Khan (1996)	1995	Agriculture		10 percent of GDP produced in agric.
Herman (1999)	1996	Cotton and wheat	\$1,533 million	8 percent of GDP

Sources: As indicated in column 1.

Table 10: Cotton producer taxes and subsidies, Uzbekistan 2000 to 2004

	(percentage of GDP)				
	2000	2001	2002	2003	2004
Explicit taxes	2.9	2.2	1.8	1.5	2.0
Implicit taxes – price gap	5.1	4.7	4.5	4.4	5.1
- other	11.5	3.3	0.0	0.3	0.4
Subsidies	7.2	8.1	2.6	2.1	2.1
Net transfers from producers	12.3	2.1	3.7	4.1	5.4

Source: Bravo and Croel-Res (2005).

Note: the 'price gap' is the gap in between the domestic currency price received by producers and the world price at the official exchange rate. Between 23 and 36 percent of this would be eliminated if VAT were refunded on cotton exports.

Table 11: Cotton taxes and subsidies, Uzbekistan, 2004

(million US dollars)

Taxes		Subsidies	
Land tax	19	Fertilizers	11
STO Commission	23	Machinery	12
Ginning taxes	35	Fuel	12
Income tax	65	Cheap by-products	28
Taxes on crushing	120	Interest rate credit	81
VAT	170	Debt write-offs	135
Producer price controls	213	Irrigation (including electricity for pumps)	161

Source: Guadagni et al. (2005, p. 7).

Note: STO = State Trading Organization.

Table 12: Cotton prices per ton, Uzbekistan, 2002

World cotton fiber price (Cotlook A index)	\$1,019
Transport & Handling (border to Riga)	\$160
Uzbekistan border price	\$859
Border price in domestic currency	672,597 (917,412)
Internal transport, handling & commissions	28,718
Ginning costs	159,111
Price of delivered seed cotton (4-5-6)	484,768 (729,583)
Ginning outturn (percent)	32
Equivalent reference price of raw cotton (7x8)	155,126 (233,467)
Domestic price at distribution center	126,000
Price gap (10/9) (percent)	81 (54)

Source: Christensen (2003, 28)

Note: Sum values are at the official exchange rate of 783/\$ (numbers in parentheses are calculated at the commercial rate of 1068/\$). Cotton marketed at negotiated prices received 151,200 sum per ton, that is, the price gap on marginal supply was 98 percent (65 percent).

Table 13: Farmgate prices for cotton, 1990 to 2004

Year	Farmgate Prices, as reported by FAO (local currency prices per ton)				
	Kazakhstan	Kyrgyz Rep	Tajikistan	Turkmenistan	Uzbekistan
1990					
1991					
1992					
1993		5,404			
1994	18,230	10,015			1,000
1995	39,468	11,965			1,000
1996	48,427	13,587	248		
1997	51,284	13,909	314	9,488,539	
1998	48,515	13,253	437	7,755,056	
1999	60,556	18,233	465	7,172,756	
2000	75,647	23,186	473	7,687,971	
2001	81,925	24,884	601	5,588,202	
2002	80,000	25,389	733	7,620,886	
2003	105,360	26,343	940	8,147,106	
2004			765		

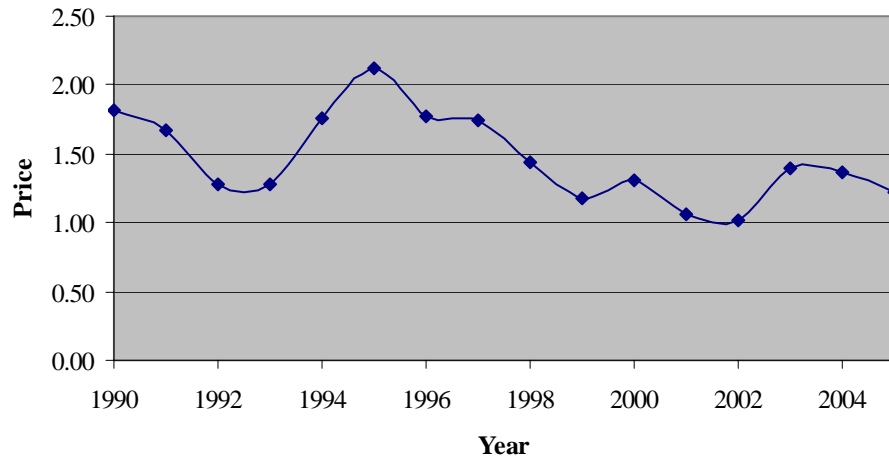
Source: FAO Statistics Division, 15 December 2006.

Year	Cotlook A Index (US\$/ton)	Reference price (A-200)/3	Farmgate Prices, as reported by FAO (US\$ per ton at official exchange rate)				
			Kaz	KR	Taj	Turk	Uz
1990	1,819						
1991	1,677						
1992	1,278	359					
1993	1,280	360		858			
1994	1,763	520	299	927			36
1995	2,128	643	586	1,108			28
1996	1,773	523	641	1,061	756		
1997	1,748	518	581	799	420	2,099	
1998	1,445	413	406	634	447	1,491	
1999	1,171	323	438	468	324		
2000	1,302	366	524	486	215		
2001	1,058	286	543	513	240		
2002	1,019	273	513	541	244		
2003	1,399	400	704	603	324		
2004	1,366	356			255		
2005	1,217	340					

Source: Author's calculations.

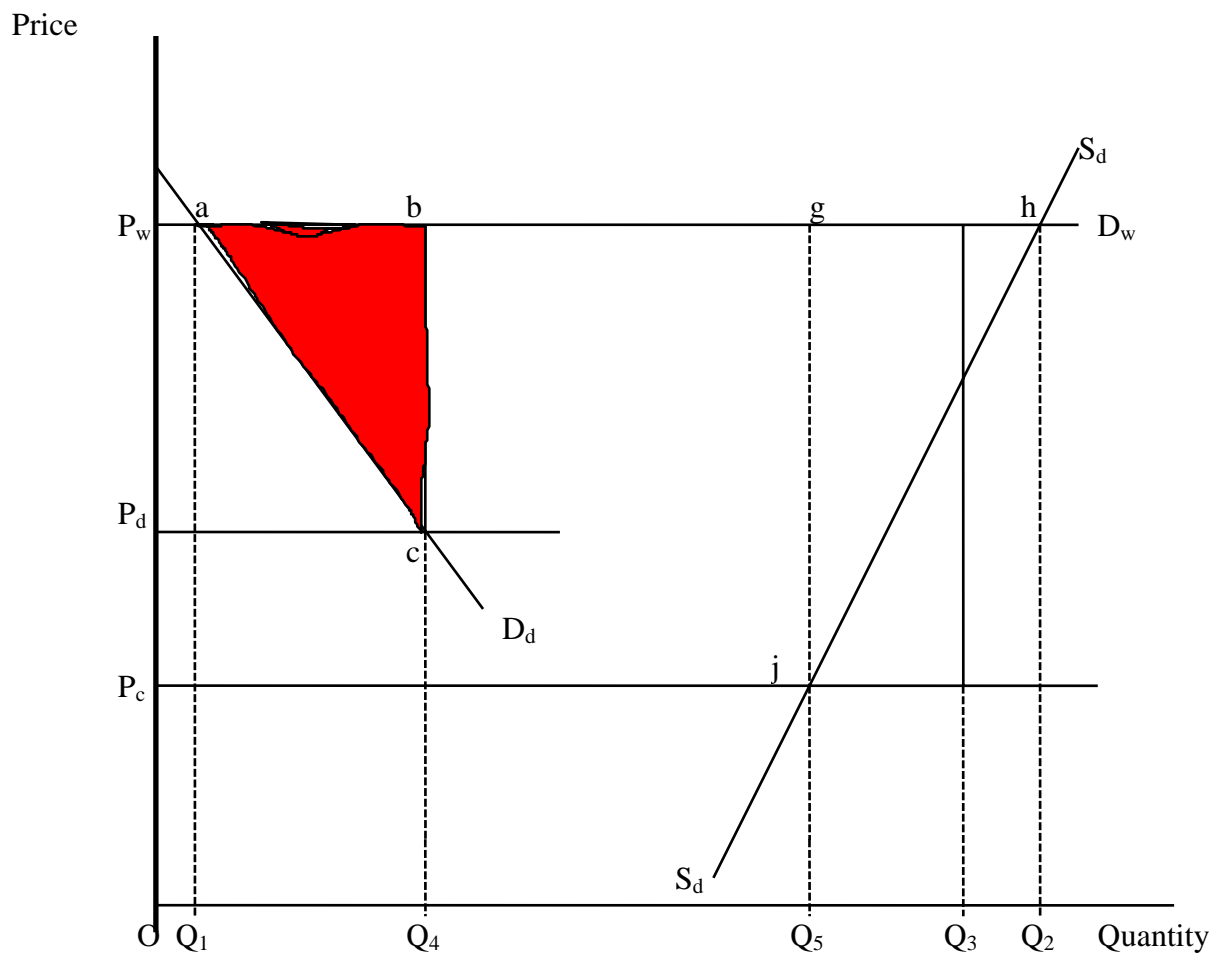
Figure 1: World price of cotton, 1990 to 2005

(Cotlook 'A' Index, US\$ per kilogram)



Source: http://www.cotlook.com/cdis/more_cotlook_indices.php also reported in World Bank and IMF (International Financial Statistics) datasets (Baffes 2008, Table B5).

Figure 2: The market for cotton in Uzbekistan



Source: Pomfret (2000, p. 274).